DEPARTMENT OF TRANSPORTATION
Departmental Energy Primer

Developed by

Division of Business, Facilities, Asset Management and Security

Caltrans Energy Conservation Program

Departmental Energy Primer

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Departmental Energy Primer

Goal:

This "Primer" discusses in general terms and the "how, when, where, and why" of energy use by the Department, and to promote a better understanding of why the Department's energy conservation team members need everyone's support in this effort.

Every employee is to be considered a member of the Department's Energy Team.

Overview:

This document begins with a discussion of terms and definitions. Followed by a brief history of the Department's energy conservation milestones. Then the discussion will move to the where/what/how's of conservation theory as it applies to the Department's energy consuming equipment/systems. Documentation and tracking energy use and savings is discussed at the local level and its integration into a statewide macro overview.

The last section of the "Primer" examines the Department's consumption patterns/profiles during summer and winter, on weekdays and weekends/holidays. Snapshot profiles during 1996, 2000, and a forecasted 200x will demonstrate how and where the Department is making progress with its energy conservation implementation program. The last charts in this section will then overlay 1996 and 2000x grid load profiles. As an additional bonus, a fourth profile set will demonstrate the statewide load profile of the Department with full implementation of project 5b (on-site total power generation).

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(*Please note, vehicle energy conservation is not discussed at this time, although many of the conservation concepts may be applied to their use and operation.*)

Terms and Definitions:

The definitions in this section do not reflect the strict "Dictionary" explanation for the term. The definitions try to keep the terminology and concepts as basic as possible. If the reader wishes greater detail, additional information is available upon request.

Amp	Is a unit of measurement assigned to the flow rate of electricity through an electrical circuit. The "Amp" rating found on a product's label defines the flow rate at which the piece of equipment consumes electricity as stated by its manufacturer. Meters that can monitor the amp draw off a device during its real-time operation may also determine amp data. Actual operational data is more useful when trying to determine savings potential for any conservation measure.
Baseline	Is the term used by conservation auditors that define the operational conditions of any device or system prior to any modification. The baseline conditions are used to calculate the impact of proposed conservation modifications, and then again used to verify the design assumptions in a post-implementation study. Establishment of baseline operational data and its use in documenting savings potentials is required before any conservation measure may be approved for funding by State Government.
Control	Is a generic name given to any device that can vary the flow of energy to consuming device(s) (on or off or somewhere in between, i.e., like a dining room light fixture dimmer switch). Controls can be hand operated or automated in some manner. All powered equipment and systems require some form of control, even if it is only an on/off switch.
Cycles per second (cps, frequency, Hertz or Hz)	An electrical term that describes how often alternating current (AC) flip/flops plus and minus orientation within a single second of time. In North America, the default frequency for AC electricity is 60 cps or Hz (Hertz); whereas in Europe and most of the rest of the world, AC electricity frequency is set at 50 Hz. That's why you need to take power adapters with you whenever you travel outside of North America. Many devices can operate at either 60 or 50 Hz with a simple flip of a switch or a change in connections, while some equipment may require an added adapter. Direct current (DC) does not alternate polarity (plus/minus poles). Batteries and photovoltaic panels are good sources of DC power. AC power sources can be converted to DC power by using an electrical device called a rectifier or (on a smaller scale) a diode.
Data	We are not talking about a certain android that goes by that name; however, we are talking about collected information about energy consuming equipment, devices, or systems. This information may include data from equipment label(s), actual monitoring of equipment when in operation, or from manufacturer's supplied product informational material. Operational data for any energy system should be collected prior to any modification to that system. Doing so allows for the establishment of a baseline operational profile of a device, system,

	facility, or statewide conservation measure.
Demand	Is an energy industry term that describes the maximum rate of electricity an electrical account will consume from the utility's power lines. The electrical utility is required to have enough capacity in its wire based distribution system to meet the reader's needs along with everyone else's needs who are also connected to the same set of wires. If too many accounts are added to the line, and the line cannot meet the total demand of those clients (like on a really hot day), circuit breakers at the local transformer or sub-station will "Trip-off" and there will be a localized power outage. If some of the safety devices fail to trip-off, then the stress to the system increases and the size of the power outage increases, at times this outage situation can spread beyond the boundaries of a state. Currently the State of California has established rules that monitor statewide demand levels, and then orders local utilities to turn off customers in a controlled way so that a statewide loss of power does not occur. The 2000/2001 rolling blackouts are an example of how this system works. Electric utilities are allowed to charge larger customers "Demand" fees/charges in addition to the regular kilowatt-hour charges every electric utility customer pays. Depending upon the size of the facility's demand, the utility may apply different fee structures. Typically, utilities look at how customers use energy during the highest system demand period (called "peak demand period" i.e., between 11 am and 8 pm in the Summer months); lowest system demand period (called "off-peak demand" i.e., between 11pm and 6 am); and whatever is left over (called "mid-peak demand" in this example that would be between 8 and 11 p.m., and 6 and 11 am.).
Demand (Continued)	The fee structure may change between winter and summer usage. The cost to supply power and maintain the distribution system helps to set the level of the demand fees. Determining the demand profile of a large facility requires the ability to monitor the rate of power coming into the facility at the electric meter. Measuring this data source only tells you how much energy you are using at any point in time. This information will not tell you where you are using the energy and when, just the aggregate for that power circuit. Many departmental facilities have more than one electric meter. Demand fees may vary between those accounts. Conservation measures that control the level of a facility's demand may not save kilowatt-hours; however, utility savings will occur if the metered account can move or defer the rate of consumption outside of the High-Peak period. This type of conservation measure is known as "demand

	management". Duty cycling of equipment, lighting system dimming, use of distributive/emergency generation equipment, thermal storage, and shutting down low priority equipment are some of the demand management opportunities available to the Department.
Electrons	Are theoretical particles that science uses to define the medium flowing in the wires. Electricity and the related technology/science gets its name from this portion of the atom (a theoretical particle). The study of statistical physics is where the reader can go to get more hard science details, including the concept of the "flow of electron holes". For the sake of this primer, the electron flows in the wires and the energy contained in the flowing electrons allows the devices to work.
Energy Budgets (device, system, facility, district, department)	Are used in the conservation measure analysis process. At the basic level of the analysis, the auditor looks at the energy budget for a single device or load. Typically, each device or group of devices are measured for how much energy they consume when turned on, under what conditions does the device operate, and the hours of typical operation over a year's period (typically based upon a 7 day, 24-hour time schedule, with a holiday operation or lack of operation correction factor.) The "device budget" is the primary building block of a facility energy audit. The auditor then uses the "device budgets" when defining the larger system(s) energy budget. System energy budgets look at the operation of various devices that have common operation and are linked together physically, electrically, or parallel operation. When all of the various "system energy budgets" are completed, the auditor or audit team reviews the systems to identify areas where the "system energy budgets" overlap or directly impact one another (i.e., lighting or computer systems adding thermal loads that impact air conditioning system operations.) The auditor also identifies variable operating conditions that impact equipment operations (i.e., weather, occupancy fluctuations, use of facility during normal business hours, change in process equipment usage, etc.) Once all the budgets are established, the auditor creates a "Facility Energy Budget." The Facility Energy Budget is then used to determine expected utility costs by the facility over a determined period of time; a month, or season, or year. The auditor tests the budget by plugging in known weather and facility operational data, then forecasts what the electrical demand, electricity consumption, and natural gas consumption for the facility. Comparison of the theoretical and real energy bill determines how close the audit data and operational assumptions are in sync. Good auditor teams should be able to "fine tune" the various device, system, and facility energy budgets based upon running the compare and contrast tests over several cycles or billing periods. The process of establishing the energy

	budgets for all consuming devices in the facility is critical to the establishment of a facility's energy baseline.
Energy Pie	Is similar to the "Facility Energy Budget." An energy pie chart for a facility illustrates the percentage of energy usage within a facility's sub-system. Segments of the "pie" may include lighting systems, heating/cooling/ventilation systems, computers, process equipment, plug loads, etc. Sometimes energy auditors will establish a preliminary "energy pie" chart after a walk through of a facility. Auditors will use the chart to keep them within a reasonable range of consumption assumptions when developing device and system energy budgets. Developing a good energy conservation audit is part science and part "art." There are no two facilities alike. Every facility is unique. Science can get the auditor close to a good solution, and the "art" gets you that much closer to a great solution. Buildings, like human beings have personalities and quirks. Finding and accounting for them is the art form only experience can generate.
Grid	Is a term used by the electricity industry to describe the network of transmission and distribution wires that link power generation sites with those of the State's electricity consumers. The term "grid" can be applied to the wiring system in any size of a geographical region, from home to North America. In California, the grid is often referred to the State's Grid. California's Grid has interconnections to the other Western states and Canada. The grid is fragile. Too much electricity trying to pass through too small a set of wires will cause those wires to heat up. If the wire gets too hot, it will fail. Depending where the failure occurs determines the level of damage to the rest of the power generators and consumers. The California Independent System Operator (Cal-ISO) is tasked to make sure that the wires stay cool and the chance of grid failure kept to a minimum. One of the reasons for rolling blackouts is to make sure the wires stay cool. This condition usually means rolling blackouts in either Northern or Southern California and not the whole state.
Hours of Operation	Every energy consuming device or system operates for some period during the year. Energy auditors work with facility operations staff to determine under what conditions the equipment operates. Fixed schedules of operation (i.e., 6 am to 6 pm, Monday through Friday) make it easy to determine how many hours of operation a device or system may operate within a week, month or year. Equipment that varies it operation from day to day, seasonally, with the weather, variable loading, or frequency of use by an operator (i.e., a personal computer, or printer) requires a higher level

	of study. Observation, the use of recording meters with duration and level of load monitoring capabilities and mutually agreed system operation modeling are some of the options to determine hours of operation for those devices or systems. When you multiply the Load (in watts or kilowatts) times the hours of operation (hours per month) the resultant of the math is expressed in watts or kilowatts per hour per month.
HVAC	Refers to "**H**eating, **V**entilation, **A**ir **C**onditioning" and is the term used to describe the various sub-systems and equipment that make up the facility's system which supplies conditioned air into the occupied spaces. Conditioned air supplies in a facility includes the moving of air, the filtering of air, the cooling or heating of air, and sometimes modified water content of the air (humidification/de-humidification). Energy consumption by HVAC systems will vary upon weather conditions and internal activity within the facility. Between 20 and 40% of the facility's energy budget is used to power the HVAC system. HVAC systems are traditionally automatically controlled. Depending upon the size and complexity of the facility, HVAC controls can be as simple as a wall-mounted thermostat, as complex as a computer based facility energy management system, or somewhere in between. It is the intention of the Department's Energy Conservation team to implement an integrated statewide energy and load management system. The system will allow any Departmental facility to link to the system using the existing Ethernet communications network. Local staff can operate linked facilities, or if no local staff is available, then remote control may occur from another facility or site. This system allows the Department to optimize staff resources to operate and respond to client service requests.
LED	Refers to **L**ight **E**mitting **D**iode, which is a small electronic device that emits light when power is applied. For years LEDs were used as indicator lights in electronic equipment. Since the 1990s however, the amount of light generated by LED devices has increased many times. So much so, the Department now uses LEDs in traffic signal fixtures. Refer to project 1a for more details, or go to the following web site for more information and product specifications: **http://www.dot.ca.gov/hq/oppd/rescons/led_site/led99x.htm** LED elements can also be found in other energy saving devices like EXIT signs, battery backup emergency lighting fixtures and mini-flashlights. The Department will continue to use LED technology as new applications are developed.
Lighting Systems	The majority of the electricity consumed, by the Department, powers some type of lighting system. Highway lighting, facility interior/exterior lighting, roadway sign lighting, traffic signals,

	bridge and tunnel lighting systems make up the majority of the Department’s lighting systems.
Load	Refers to any device or system that consumes energy, especially electricity. The “load” or workload in an electric circuit consumes the electricity and performs some kind of task, function, duty, or work. Light bulbs and motors are types of loads. The power needed for the device or system to perform its work is sometimes rated in “watts” (i.e., 100-watt light bulb, 500-watt microwave, etc.).
Motor	Refers to any device that uses electricity to create a motive force, either rotary or angular motion in order to perform work. Motors are used in fans, pumps, damper operation, compressors for air or cooling medium, elevators, escalators, printers, computer media drives, etc..
Phase Factor	Vector math, made easy! Simply put, devices normally get their electricity by either single or three phase wiring. All electrical devices are required to say single or three phase on the body of the device and the installation instructions that comes with the device. For already installed equipment, look for the phase rating in the same location where voltage and amp data is marked. (Rule of thumb is two wires plus optional ground wire is single phase, three wires plus optional ground wire is three phases.) When calculating how much power a device or load uses, you need to multiply the current (amps) times the Voltage and then multiply that number by the square root of the phase of the device (for single phase you use 1; for three phase you use 1.7321. You can get more digits to the right of the decimal point if you want, however, most of the time 1.7321 works just fine.)
Power Factor (and correction)	iron. A capacitance load uses an electronic device called a “capacitor” that can store electrons, much like a battery, and release a pulse of electrons upon command. Fluorescent lights use capacitors to help start-up. The power factor of a device (or more importantly a facility) is important for two reasons. 1) If the power factor of a facility is below a threshold level, the electrical utility will assess a penalty fee based upon the size of the facility demand factor. Facility power factors are correctable and a cost effective conservation measure. 2) In the case of devices that may have to operate on battery backup (like LED traffic signals), if the power factor is low, then the amount of effective on time supplied by the battery is reduced. Example: If a device with a PF of 100% yields you 10 hours of battery backup operation, then a device with a PF of 50% will yield you 5 hours of operation. With this in mind, current departmental performance specifications for LED traffic signals requires the device to have a minimum PF rating of 95%. Quality testing shows

	most devices at around 98%.
PV, (photovoltaic)	PV technology extracts selected spectrums of sunlight and converts the light into electricity. PV systems are proven technology that has moved from the "custom design" to "off the shelf" massed produced product. The Department has used PV systems in repeater communication stations, emergency call box systems, facility power applications, warning beacons, traffic signals in remote locations, etc., over the last 17 years. Recent legislation may allow for the funding of PV systems installations at departmental facilities over the next 24 months.
Volts, voltage	Short version: The pressure behind the electrons flowing in the wires of a circuit that are necessary to push the electrons through a device. Operational voltage levels are standardized to simplify production of electrical devices and equipment. Long version: One volt is an electrical unit of measurement that describes the electrical potential difference and electromotive force equal to the difference of potential between two points in a conducting wire carrying a constant current of one ampere when the power dissipated between these two points is equal to one watt and equivalent to the potential difference across a resistance of one ohm when one ampere is flowing through it.
What's a watt? (VA or volt-amps, KW-kilowatt, Mw-megawatt, Gw-gigawatt.)	A watt is a unit of measurement of energy that defines how much work is to be performed by the electricity. Wattage is calculated by multiplying a device's operational voltage times its rated amperage, times its phase factor. (Example for a single phase motor: 120 volts X 11 amps X (the square root of 1) = 1,320 watts Example for a three phase motor: 120 volts X 11 amps X (the square root of 3 or 1.7321) = 2,286.4 watts) **To convert watts to:** Kilowatts (1000 watts) divide watts by 1000 Megawatts (one million watts) divide watts by 1,000,000. Gigawatts (one billion watts) divide watts by, 1,000,000,000 Most non-residential electric accounts pay for the level of power service (KW Demand charges) that the facility may require the utility to provide if all the electrical equipment in the facility should come on at the same time. Most utilities only invoice demand charges based on real measured rate of consumption of the facility rather than its true potential demand.
Watt-hour (kilowatt-hour, megawatt-hour, etc.)	When anything consumes electric power (watts) over a period of time (an hour) the resulting consumable is known as a watt-hour, a thousand watt-hours is known as a kilowatt-hour or kWh. Electric utilities charge customers for the consumption of kWh. In

	automobile terms, a kWh is like a gallon of gasoline. The only difference is that we buy gallons of gas before we use them, and kWh are purchased as we use them. The “on-demand” delivery feature of electricity and natural gas commodities forces the supplying utilities to ensure sufficient product on hand to meet every users’ needs. When need exceeds supply, two things happen, the price to deliver added supplies goes up, and if the capacity of the supply network is reached, then curtailments of supply may occur. Bulk procurement of kilowatt-hours is measured in 1000 kWh units or megawatt-hours (mWh), or 1,000,000 kWh units called gigawatt-hours (gWh).

In the beginning:

In the mid 1970s, the world saw the beginnings of market- driven energy shortages of oil supplies. The transportation sector and heating fuel industries were hit the hardest. Some of the impact of these periods of shortages were cost increases in the electrical supply market. The Department was one of the first government agencies to look at how it was using electricity to light up its roadways during this time. Two major efforts were undertaken during this time period.

1) The Department decided to only illuminate points of conflict (like on/off ramps and lane merges at those locations) and to reduce that amount of light to its minimal level. This effort was a major departure from the trend to light up every mile of roadway, like the eastern states. Data collected from that effort suggests that over 50% of the existing fixtures were removed and used on new construction projects and as maintenance replacement supplies.

2) The Department also modified its design specifications for future construction and rehabilitation projects to reflect these changes in policy.

During the electrical energy crisis in the late 1970s and early 1980s, the Department worked with the California Energy Commission (CEC) to conduct CEC energy audits at most facilities larger than 35,000 square feet. No/Low cost conservation retrofits were implemented by departmental staff with the assistance of California Conservation Corps members who were on six-month loan to the Department. At that time, a lot of the facility lighting systems were delamped with ballast disconnected.

In 1983, the departmental management decided to centralize all conservation efforts by the Department into a single functional unit called the Resource Conservation (RC) Program located within HQ Project Development. The rational for the RC Program location in Project Development was due to both the mission of the unit to develop conservation opportunities for the Department, and its neutral position within the organization. RC Program was charged to develop/coordinate/facilitate/promote the Departments conservation efforts in the areas of energy, water, recycling, alternative energy and recycled material applications.

Beginning 1983 through 1988, the Department conducted a series of detailed facility energy audits on a sampling of different size facilities located in various ecosystems. The Department let a series of contracts with UC Santa Barbara to inventory and wind map departmental sites to determine optimum wind power generation. Antioch Bridge site tops the list and full site wind mapping study was implemented. During the same period, Caples Lake Maintenance Center was the site of a major photovoltaic (PV) and co-generation hybrid power plant to replace the existing diesel generation system. The center is not connected to any utility grid. The project won awards for excellence by the State and the Federal Department of Energy. One of many awards to be given to departmental resource conservation projects.

In the late 1980s, the Department initiated two facility conservation retrofit implementation programs. The goal of the demonstration projects was to determine the most cost-effective method to implement statewide conservation retrofits in the Department's facilities.

- State Efficiency Bond Act Project funding through the Public Works Board and General Services/Office of Energy Assessments (now known as DGS/Energy Management Division or EMD). District Offices in D-7, D-8 and D-10 were scheduled to participate in this project. About $1.7 million in funding were approved for use to fund projects previously identified in investment grade energy conservation audits of the facilities.

- Energy Service Contracting (ESCO) funding of the entire project at three departmental locations (District 3 and 11 district offices and the Bay Bridge Administration Complex.) Approximately $1.9 million in project and finance costs would be paid off over 12 years in monthly installments, where the monthly payments were less than the real value of the energy saved. Therefore, the Department got major improvements to its facilities with no up- front capitalization and documented savings covered payments plus an annual average net saving to the Department of about $60,000.

Results of the post analysis determined that only about 40% of the Bond- funded projects got installed do to staffing shortages that did not allow all cost effective projects to be implemented. Unspent monies were returned to DGS. About four years after completion of the projects, the Bond loan was paid off. Of the ESCO projects, 100% were implemented, with payments expected to be completed in 2002. Monthly project reports still continue to document net savings to the Department. As a result of the analysis in 1994, departmental management approved the development of a statewide ESCO program for all remaining facilities. The Department, CSU (California State University) Chancellor's Office, and DGS/EMD staff started to develop a statewide ESCO program in 1994. Five years later with new legislation that authorizes ESCO funding of Conservation retrofits in State facilities, departmental and DGS staff started to implement a statewide ESCO program. Further information on the efforts of this project can be found in Project 5a in the main body of the 2001 Energy Conservation Plan Status Report.

Between 1990 and 1997, the Department identified numerous conservation opportunities at various departmental sites. A summary of those projects can be found in the main body of the 2001 Energy Conservation Plan Status Report.

The major conservation opportunity to identify itself during the early 1990s was the LED traffic signal upgrade project. Departmental staff helped to develop the product from a prototype to field installed studies, to final performance specification adoption. The Department is one of the leading forces that helped to establish national acceptance of the product. On average, the application of the LED signal reduces operational connected electrical load by 92%. Field life of a traffic signal went from about a year of operation for red incandescent lamps to over five years for red LED signals. LED signals rarely burn out like incandescent lamps. Replacement of LED signals are scheduled when the fixture get too dim to be seen during sunny daytime operation. Amber and green signals last longer in the field since their operational hours are far less than red. Part of the project effort included the establishment of a Qualified Products list and a series of multi-vendor master service agreements for the procurement of LED signal fixtures. More information can be found at: http://www.pd.dgs.ca.gov/default.asp?mp=/acqui/ledtraffic.asp

A side benefit of full LED signalized intersection upgrades is that battery backup system (BBS) installation costs dropped from over $60,000 per intersection down to about $5,000 (if system fits into existing signal control boxes.) More information can be found at the following Web site: http://www.dot.ca.gov/hq/esc/ttsb/electrical/electrical_index.htm

Beginning late summer of 2000 and continuing through late spring of 2001, the Department, working with a number of other State agencies and the Governor's Office, developed a series of emergency and project implementation action plans to help reduce the potential of rolling blackouts during the summer of 2001. Some of the results of these efforts are included in the main body of the 2001 Energy Conservation Program Status Report and its Attachment A.

Fiscal Year 2001/2002 and beyond will continue to see the Department continue its leadership role in the State's conservation efforts. Currently defined conservation opportunities will be implemented, and research and development of new technologies and their applications at the Department will continue.

Where does the Department use energy:

Energy is consumed in some of the following areas:

- Traffic Signals (including ramp meters, lane control, warning beacons)
- Roadway Lighting
- Roadway sign Lighting
- Exterior Security Lighting
- Tunnel/Bridge Lighting
- Tunnel Ventilation
- Irrigation/Storm Water Pumping
- Facility Interior Lighting
- Facility HVAC Systems
- Computers and Ancillary Equipment
- Facility "Plug Load"

What consumes energy at departmental sites:

Some of the types of loads that consume energy include:

- Lights of any kind
- Motors, fans, pumps
- Computers, monitors, printers, plotters, servers, switches/routers/hubs, scanners, external media drives,
- Copy machine/FAX
- Staff appliances
- Chillers and refrigeration equipment
- Cooling towers
- Heaters/boilers
- Water coolers
- Process and manufacturing equipment
- Elevators, escalators
- Control systems
- Other plug loads.

How do we control the consumption- past, present, and in the future:

Before automated controls were introduced in the middle part of the 1900s, most loads were turned off by an On/Off switch of some sort. It was and is true at most departmental sites. During the 1960s and 1970s, automated control systems were installed into various energy consuming devices and systems within the Department. Photocells and time clocks were added to external lighting systems. The time clocks made sure nighttime lighting systems did not come on during very cloudy days. Building automation systems for HVAC systems were installed to ensure better control of room temperatures. During the 1980s and 1990s, improved automatic control systems with more computing power were introduced and installed in some of the more recent departmental facilities.

Future control system options for the Department includes a statewide integrated energy conservation and load management system that allows the department to optimize statewide energy consumption. Distributive electricity generation, co-generation, alternative power generation, load cycling and curtailment, optimized cycling and loading of lighting and fan systems on a regional and statewide basis. The Department is working with the California Energy Commission and DGS/EMD staffs to define performance specifications for a larger version of the Department's statewide network. The concept of this larger version is to allow other state and local government agencies and department facilities, and the UC/CSU systems to be part of a larger government power block. The vision of this project is to use the conservation/load management abilities of this network to become a market force to help stabilize energy prices in California.

How do we tract the usage, past, present, and in the future:

Most people look at their power bills and compare them against previous months or years operational data. In 1985, the Department started to automate utility invoice payments through the use of summary billing practices with cooperating utilities. Thousands of bills could be processed in the same time a single paper based invoice was processed. Over the years the Department has refined this process so that now the utility invoicing computer systems talk directly to the Department's accounting computer system. Once the invoicing data is sent, the Department 's computer transfers funds from the State's account into the utility's bank account. This process saves the Department millions of dollars in avoided accounting costs. As a result of this process, no one sees paper utility bills any more. Also in 1985, it was recognized that a lack of utility bills meant that staff had to find a different way to measure effectiveness of conservation activities.

Project by project conservation energy savings was the practical solution. Before any modification to a device or system is made, as part of a conservation measure, the energy auditor must establish an energy budget for the system. Documentation of the established energy budget forms the basis for a baseline energy profile of that project. From there, forecasts as to how the proposed conservation measure will perform against the baseline. That forecast is used to justify and obtain funding for the implementation of the project. Once the project is implemented, meter readings of operational parameters are collected and compared to the forecasted data and the baseline profile. Periodic data collection to verify continuation of savings must occur during the period of projected payback. Adjustments may be made over time to account for changes in business- driven operational parameters of the device or system(s). Baseline profiles may also need to be modified to reflect changes in operational parameters. This is done to ensure a valid comparison.

This type of analysis has to be performed for every conservation measure currently implemented or planned to be implemented to ensure up-to-date status of the Department's conservation efforts. To date, most of this process requires manual data entry into databases and spreadsheets.

Future tracking of installed conservation measures are planned to be fully automatic. Real-time data collected from facility energy meters, and energy management systems will be available for analysis via a web site. The Department is again working with DGS/EMD staff to develop such a statewide system under a grant from the California Energy Commission. More information will be available as the project develops. An update of this effort will be included in next year's report, and the Department's Resource Conservation Web Site: http://www.dot.ca.gov/hq/oppd/rescons/rchomepg.htm

The Department will continue the practice of tracking and measuring the effectiveness of those conservation measures on a project-by-project basis. Utility data will be used to determine the value of the documented savings.

From micro to macro, trying to understand how all the pieces fit together:

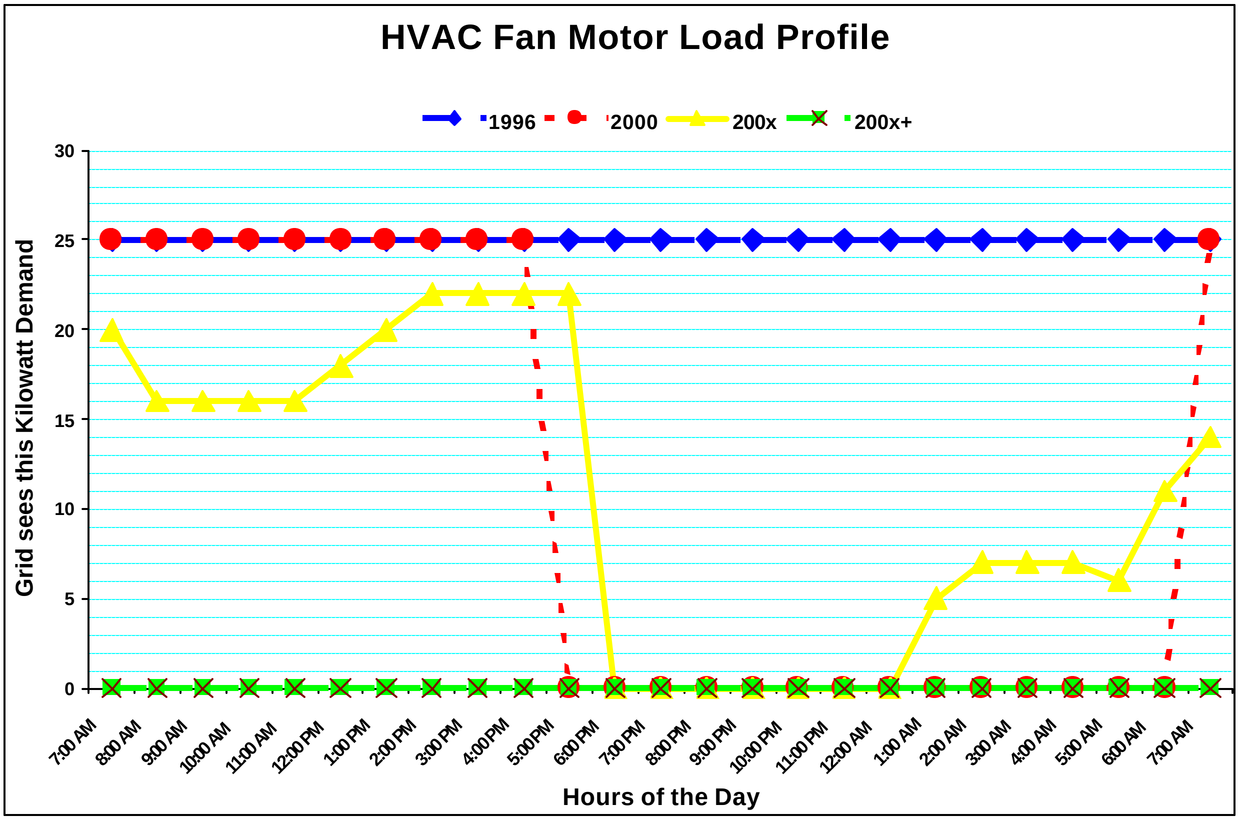
Most of this "Primer" has dealt with the "micro" point of view, at the device or system level. The remainder of the "Primer" will focus on the "macro" or "big picture" point of view. So, how do the small projects relate to the statewide consumption profile?

A common ground is a good starting point. Every day has 24 hours, and a day of equipment operation fits into one of two categories: A workweek day or a weekend/holiday (non-business day).

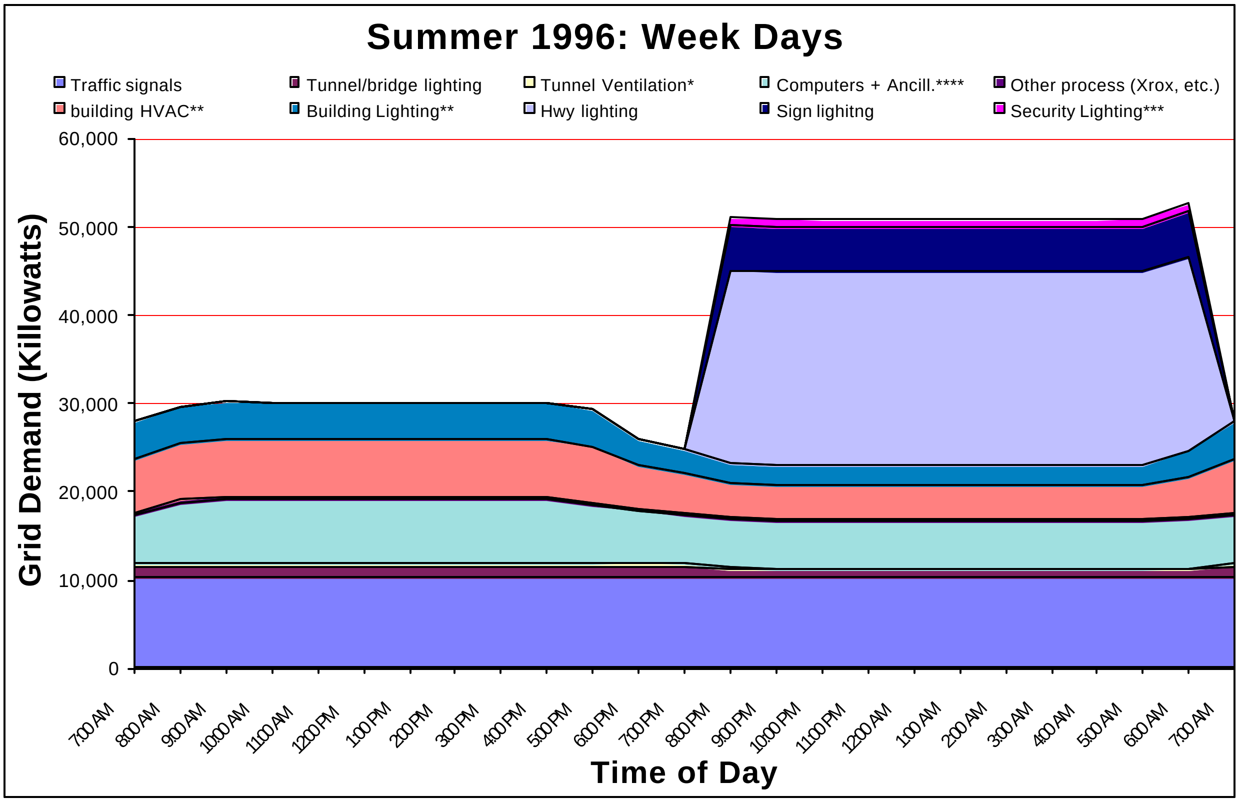
Some loads only operate during the business portion of the day and may turn off or reduce the level or energy consumption during non-business hours. Some loads operate at night or daytime only. Some loads are on all the time.

Some loads vary their operation as a function of weather.

The following chart is for a motor that drives a fan in an office building. This chart is plotted over a 24-hour period of time (from 7 am to 7 am.).



Based upon the various groups of energy consuming equipment listed earlier in this document, data was collected from past energy audits, and Maintenance equipment records. From these various data sources, typical operational profiles can be applied towards the loads. A sample chart below shows the sum of all the Department's loads divided into three load categories: Base Load, Nighttime Loads, and Building Loads.



Statewide Consumption Profiles:

Departmental statewide consumption profiles look at trends of consumption. There are four sets of profiles included in this section of the Primer.

1. Before 1996, which will function as a baseline of consumption profiles for the 1990s. Some conservation has occurred prior to this date, and they are now considered part of the baseline.
2. 2000, represents the transition of the Department as conservation projects come on line.
3. 200X, represents the potential impact of all currently planned conservation measures should they be implemented. (Note: these series of charts represent the best-educated forecast of the profile trends.)
4. 200x Plus, represents the impact of having all Department facilities generating their own power.

Each set of charts contains ten charts in the following order:

Summer Weekday vs. Weekend/holiday total profiles

Summer Weekday 24- hour primary load profile

Summer Weekend/Holiday 24- hour primary load profile

Summer Weekday 24- hour summary load elements profiles

Summer Weekend/Holiday 24- hour summary load elements profiles

Winter Weekday vs. Weekend/holiday total profiles

Winter Weekday 24- hour primary load profile

Winter Weekend/Holiday 24- hour primary load profile

Winter Weekday 24- hour summary load elements profiles

Winter Weekend/Holiday 24- hour summary load elements profiles

The last set of charts in this section will compare and contrast some of the charts in sets 1 vs. 3 and 4. The differential seen in those charts are meant to illustrate the forecasted improvement in the Department's efforts to optimize its energy consumption.

In conclusion, "the never ending story":

As illustrated in this document, there is a lot of work to be done by all. Vehicle fuel consumption improvements will be added to future editions of this primer. Updates to the profiles will occur. New technologies will allow further conservation opportunities to the remaining energy-consuming inventory.

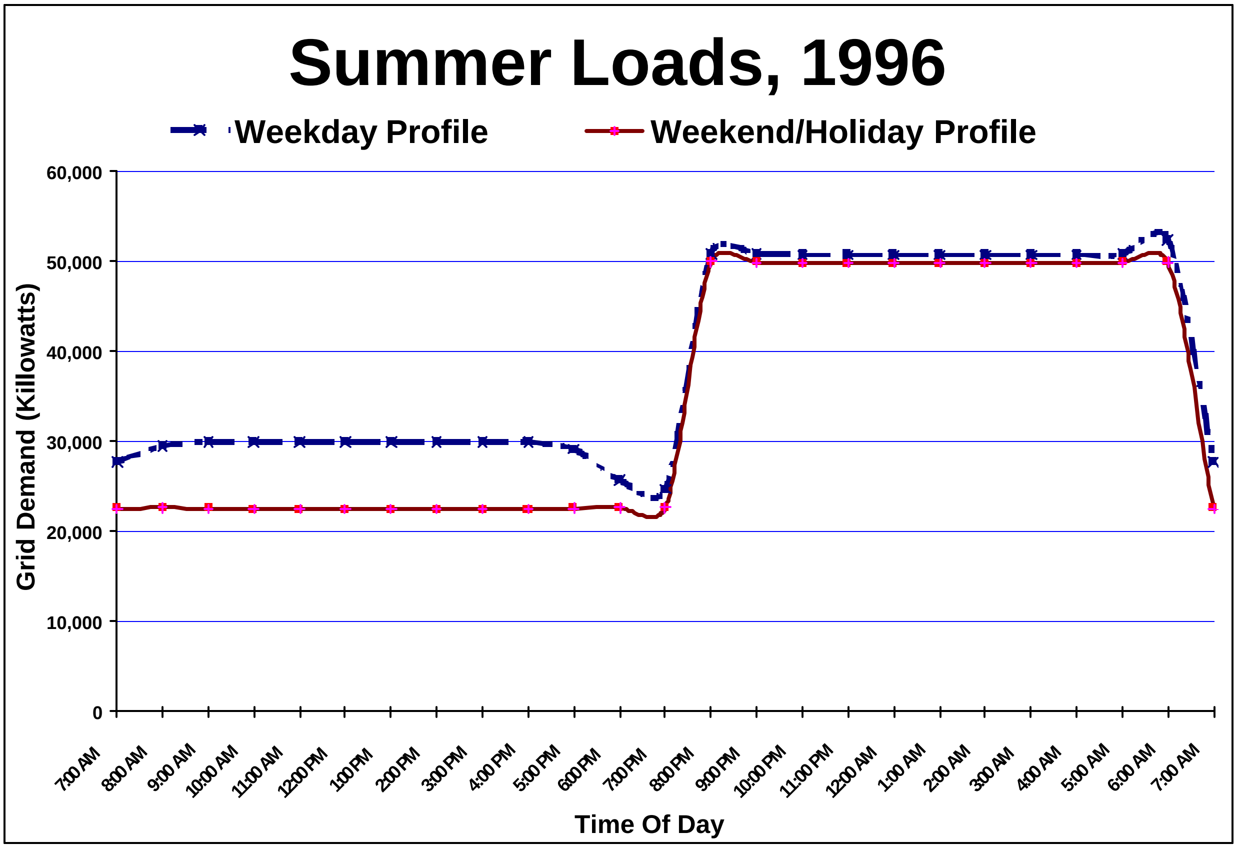
Remember the best conservation measure is to not have to use it in the first place. So, use it if needed and turn it off when not in use.

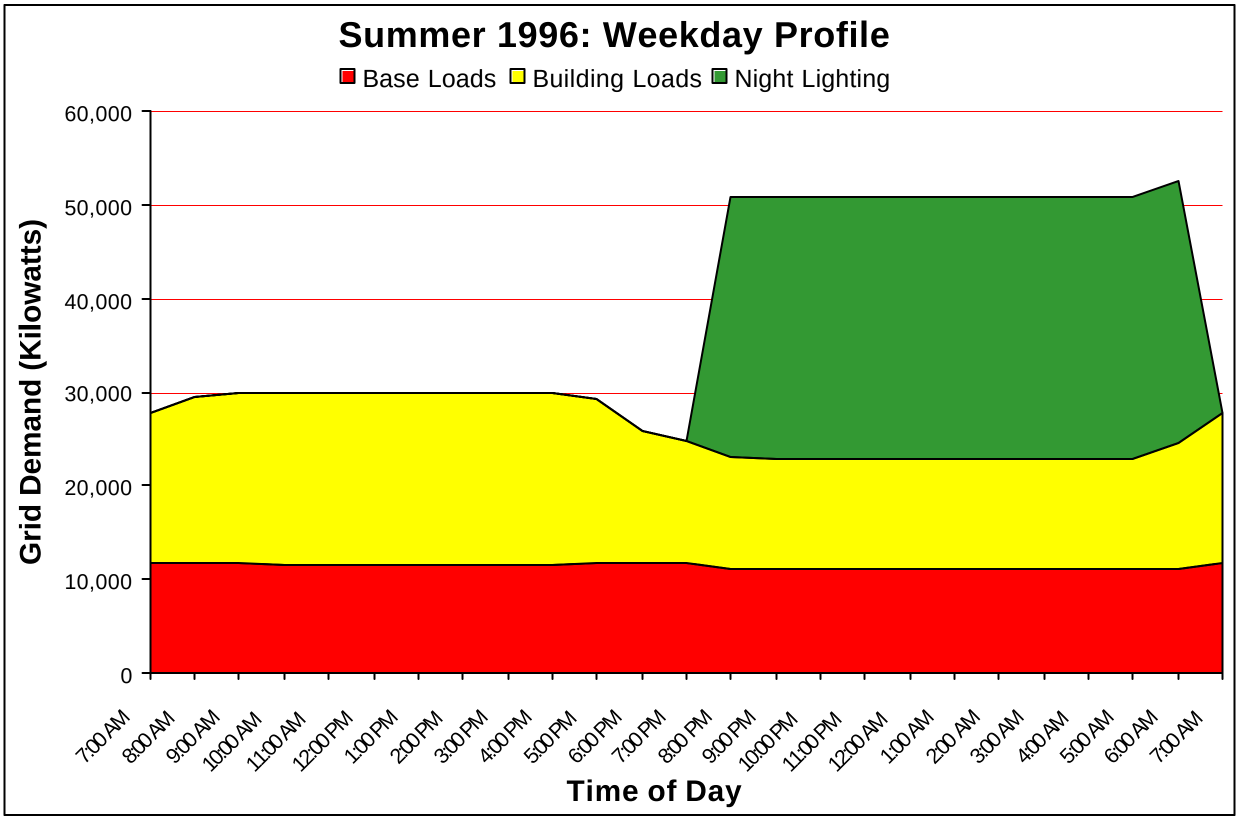
Stephen C. Prey, Coordinator

Departmental Energy Conservation Program.

1996 Data Charts
Baseline

Summer of 1996




Summary 1996: Weekday Profile
Base Loads
Building Loads
Night Lighting
60,000
50,000
40,000
30,000
20,000
10,000
0
Grid Demand (Kilowatts)
7:00 AM
8:00 AM
9:00 AM
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11:00 AM
12:00 PM
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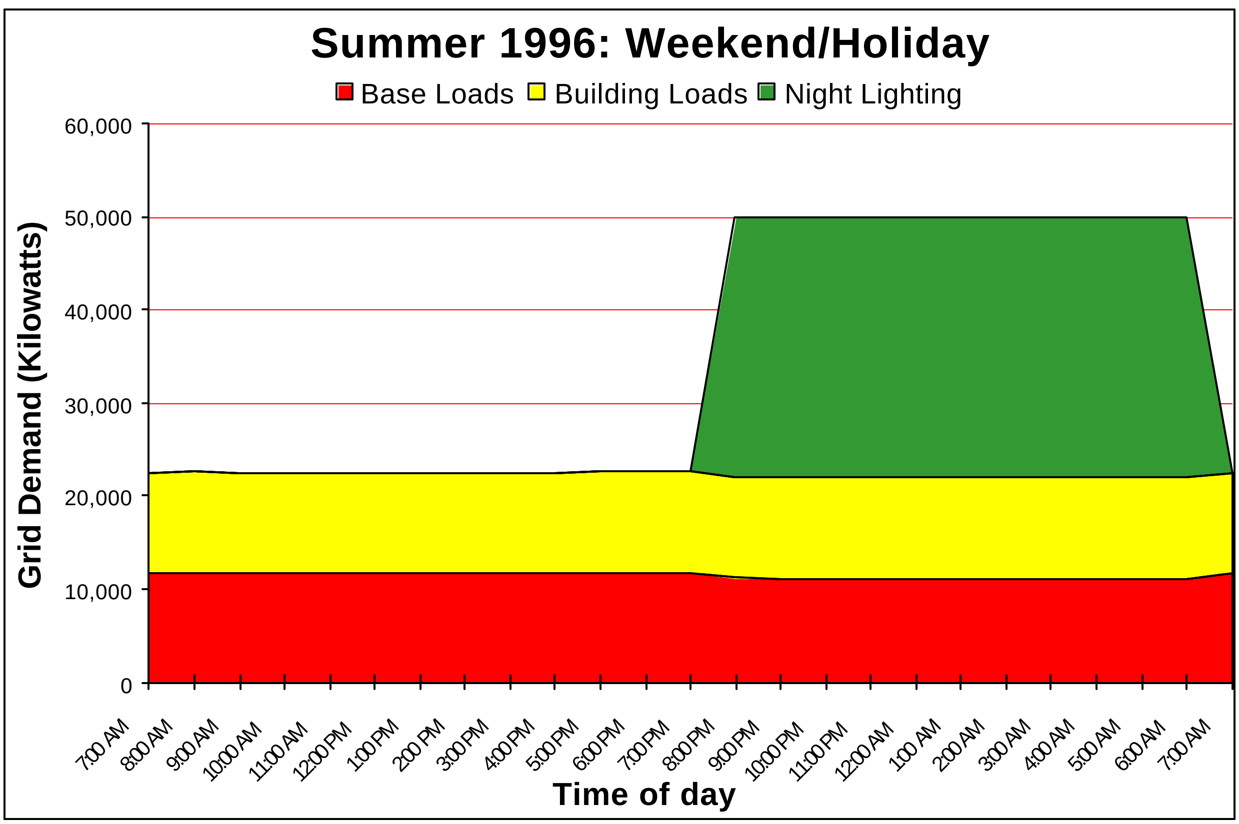
Time of Day


Summer 1996: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
60,000
50,000
40,000
30,000
20,000
10,000
0
Grid Demand (Kilowatts)
7:00 AM
8:00 AM
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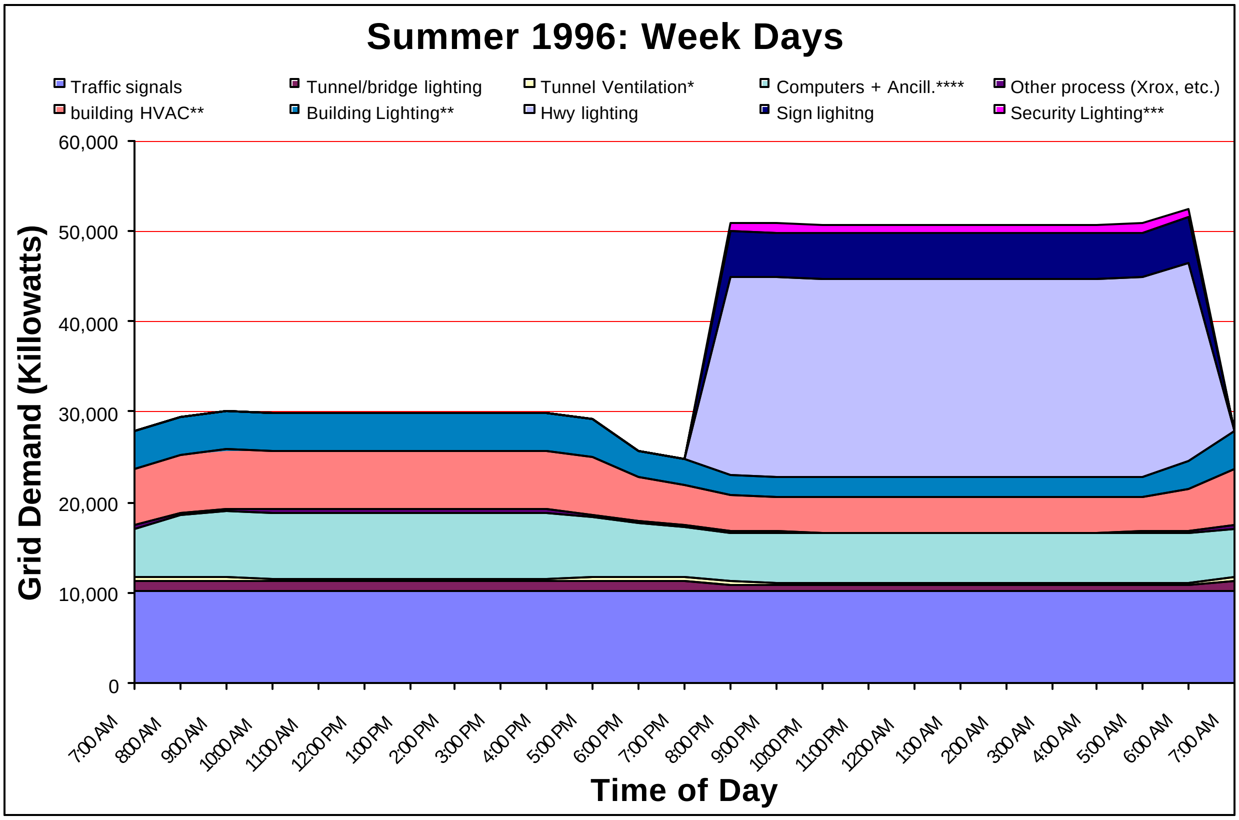
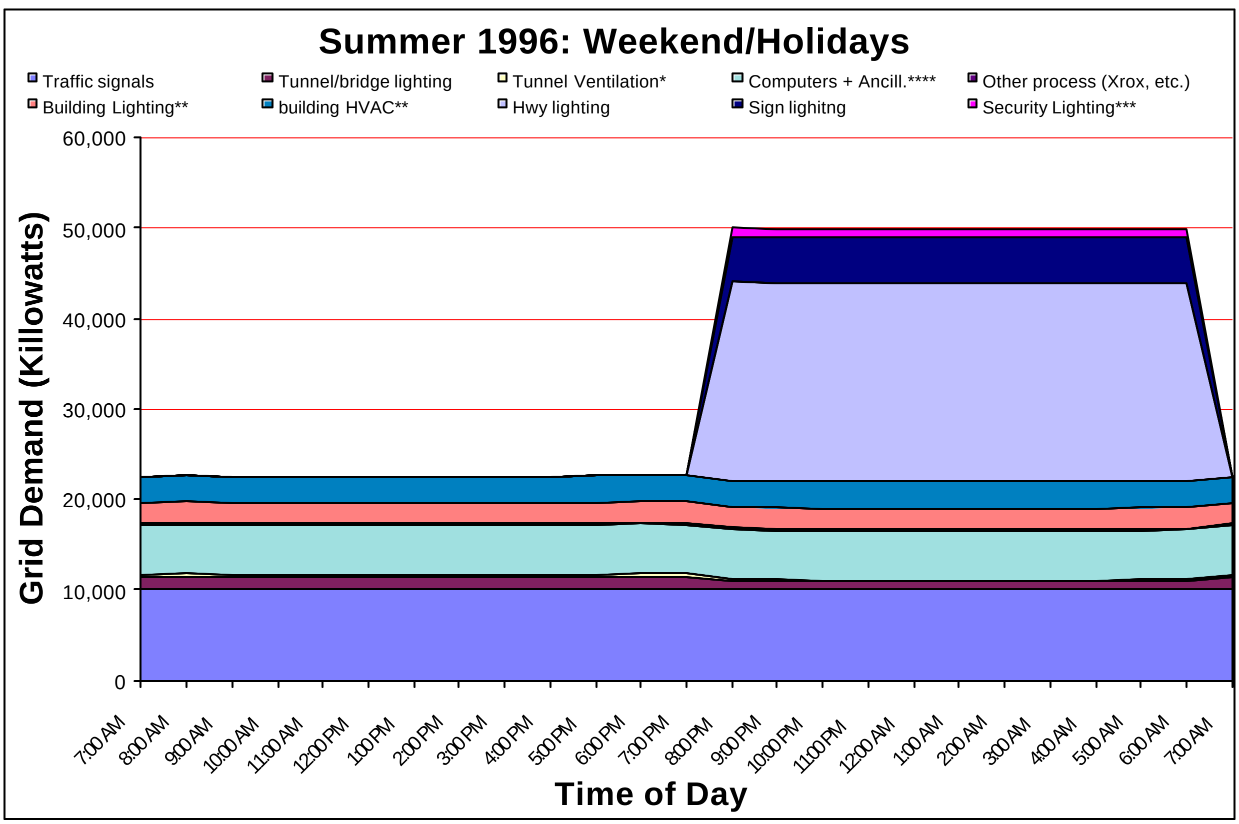
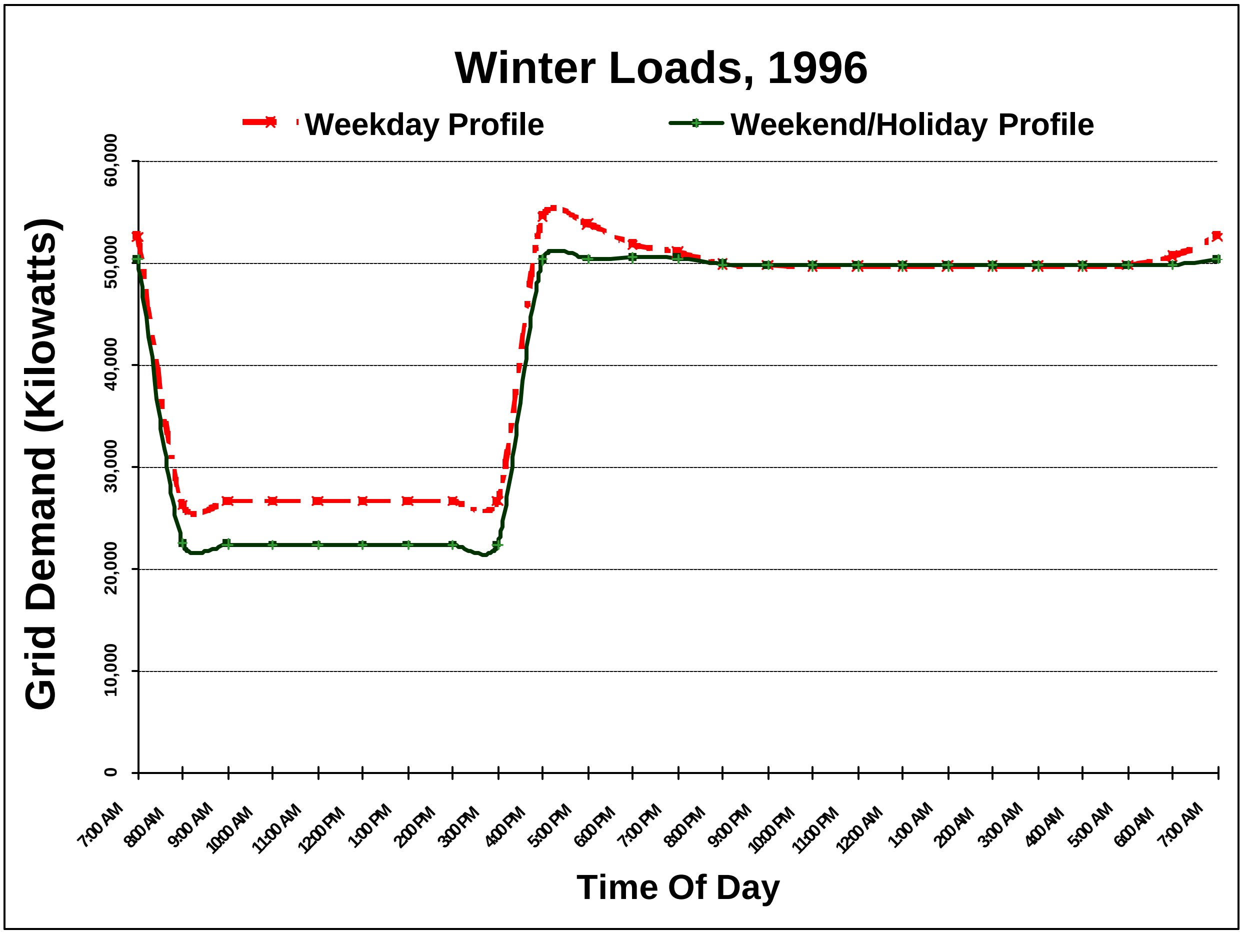
Time of day





Winter of 1996


Winter Loads, 1996
Weekday Profile
Weekend/Holiday Profile
Grid Demand (Kilowatts)
60,000
50,000
40,000
30,000
20,000
10,000
0
7:00 AM
8:00 AM
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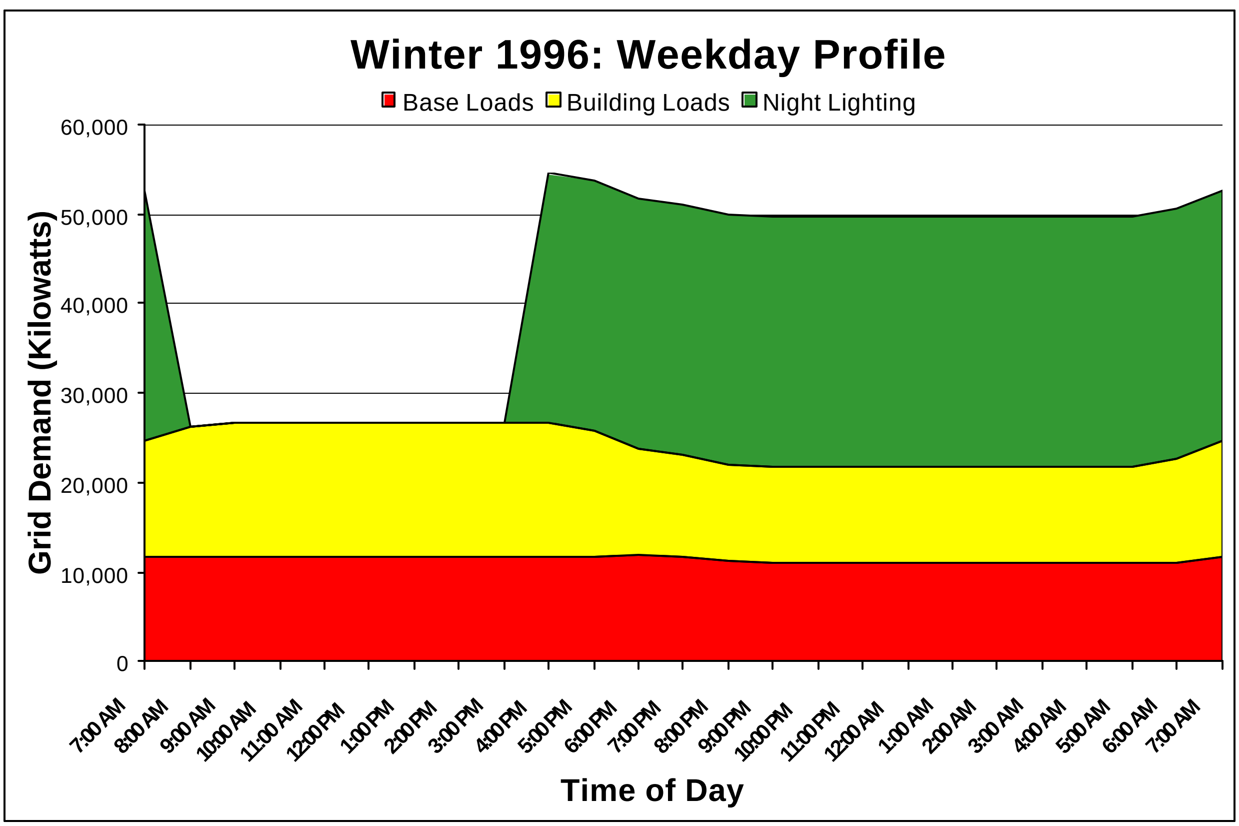
7:00 AM
Time Of Day


Winter 1996: Weekday Profile
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
60,000
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7:00 AM
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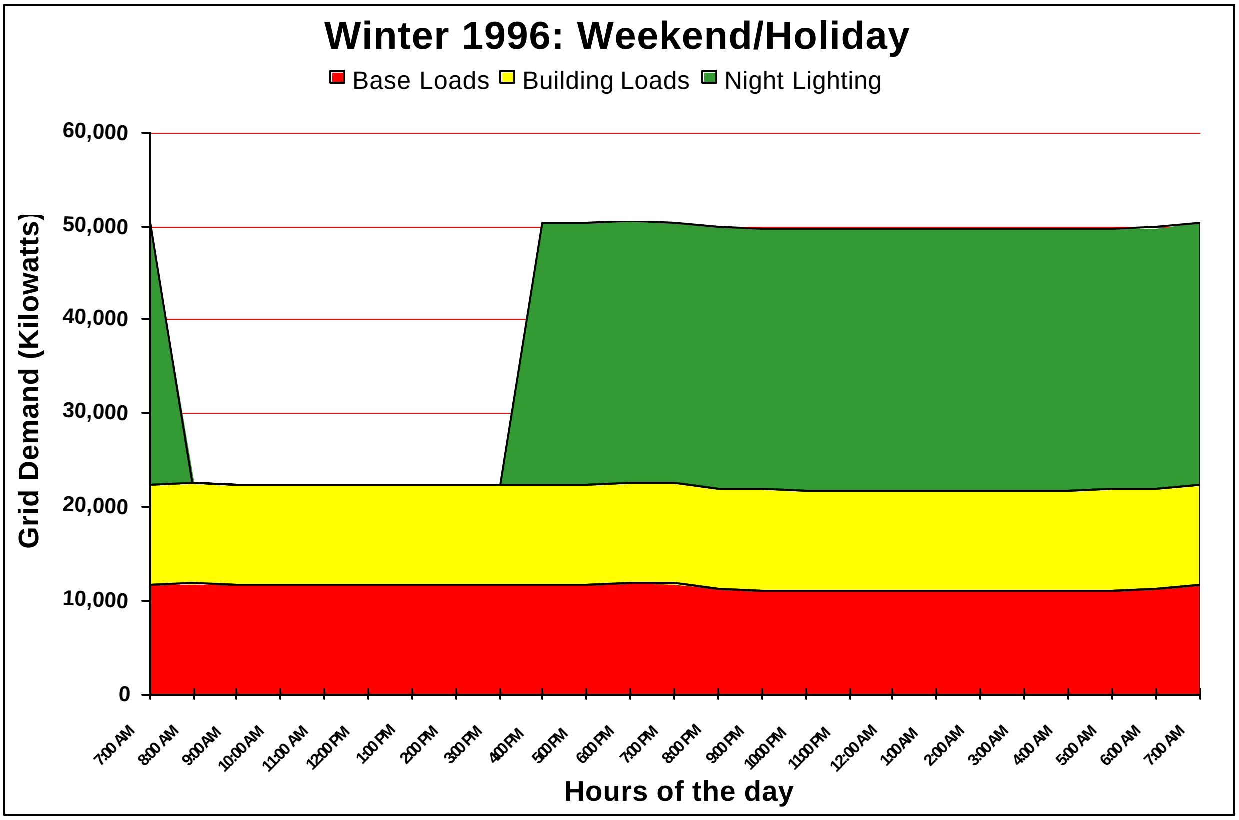
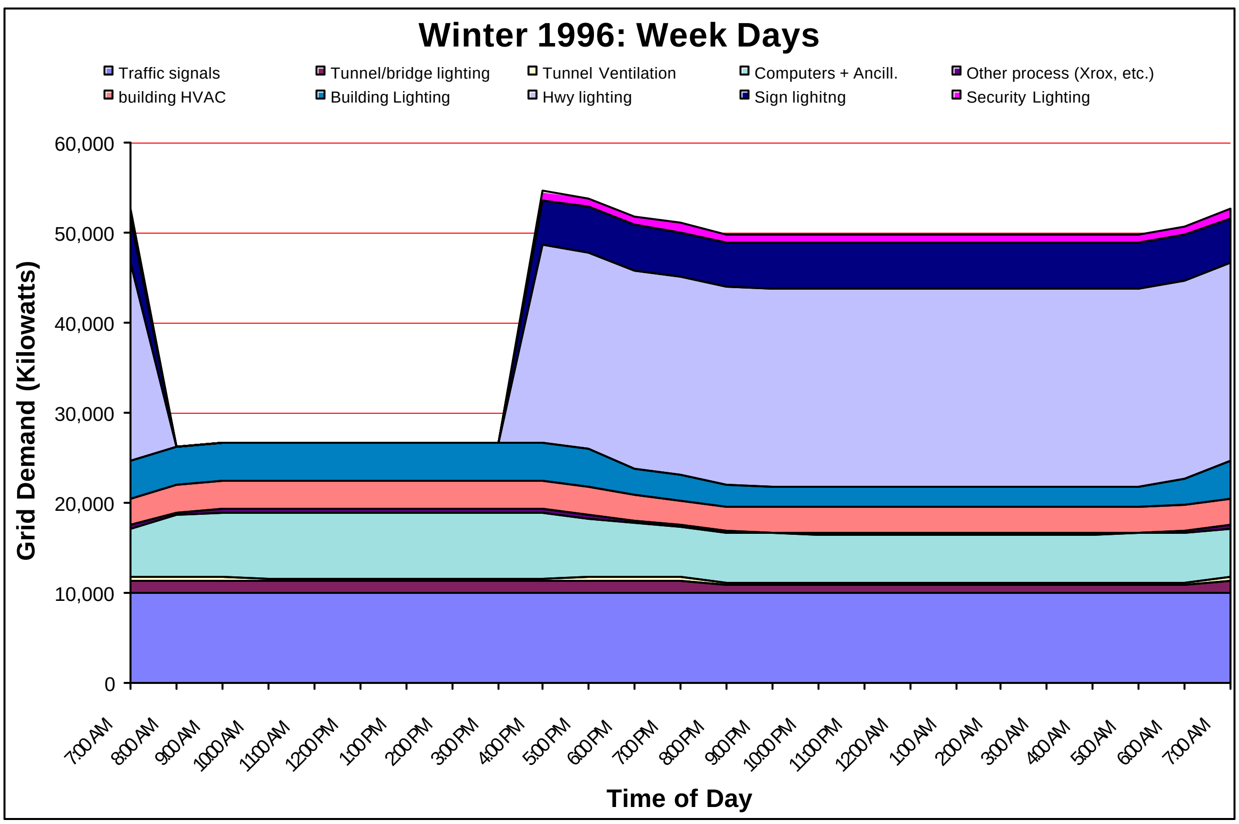
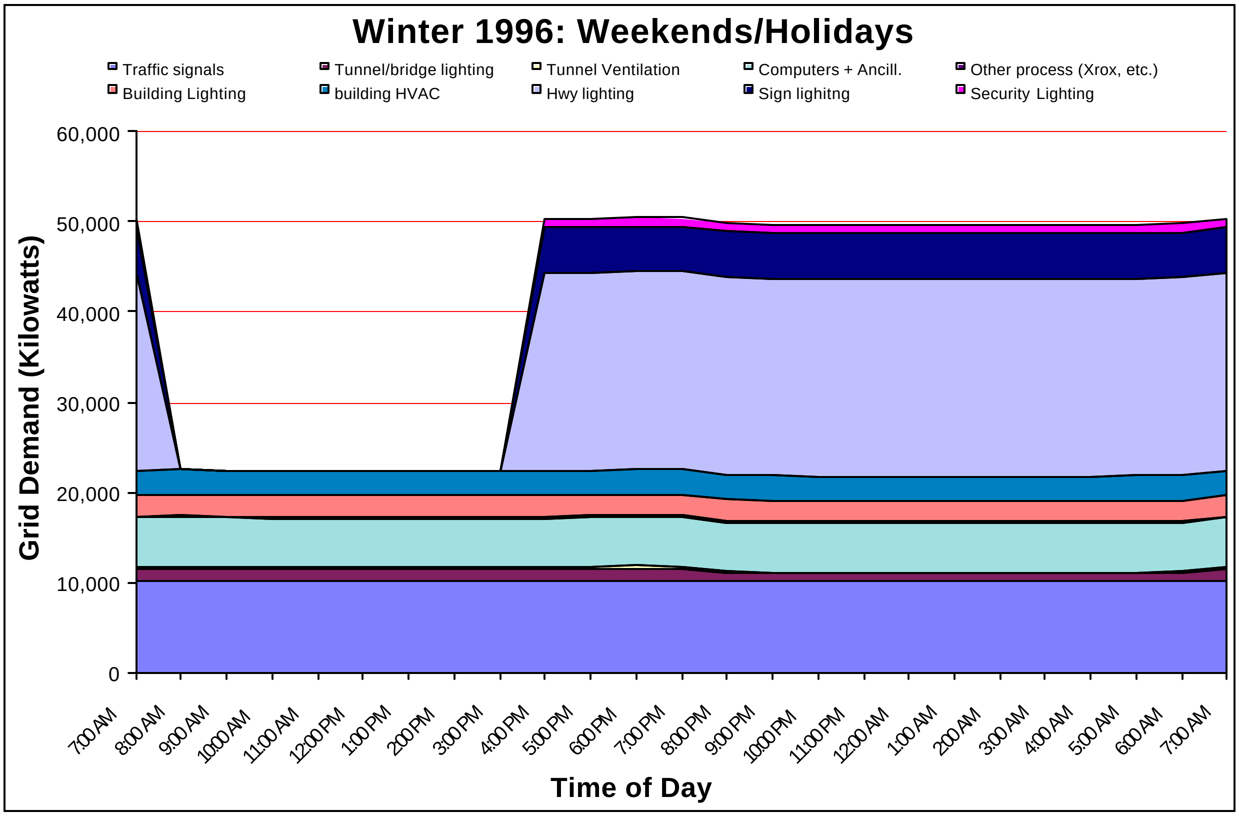
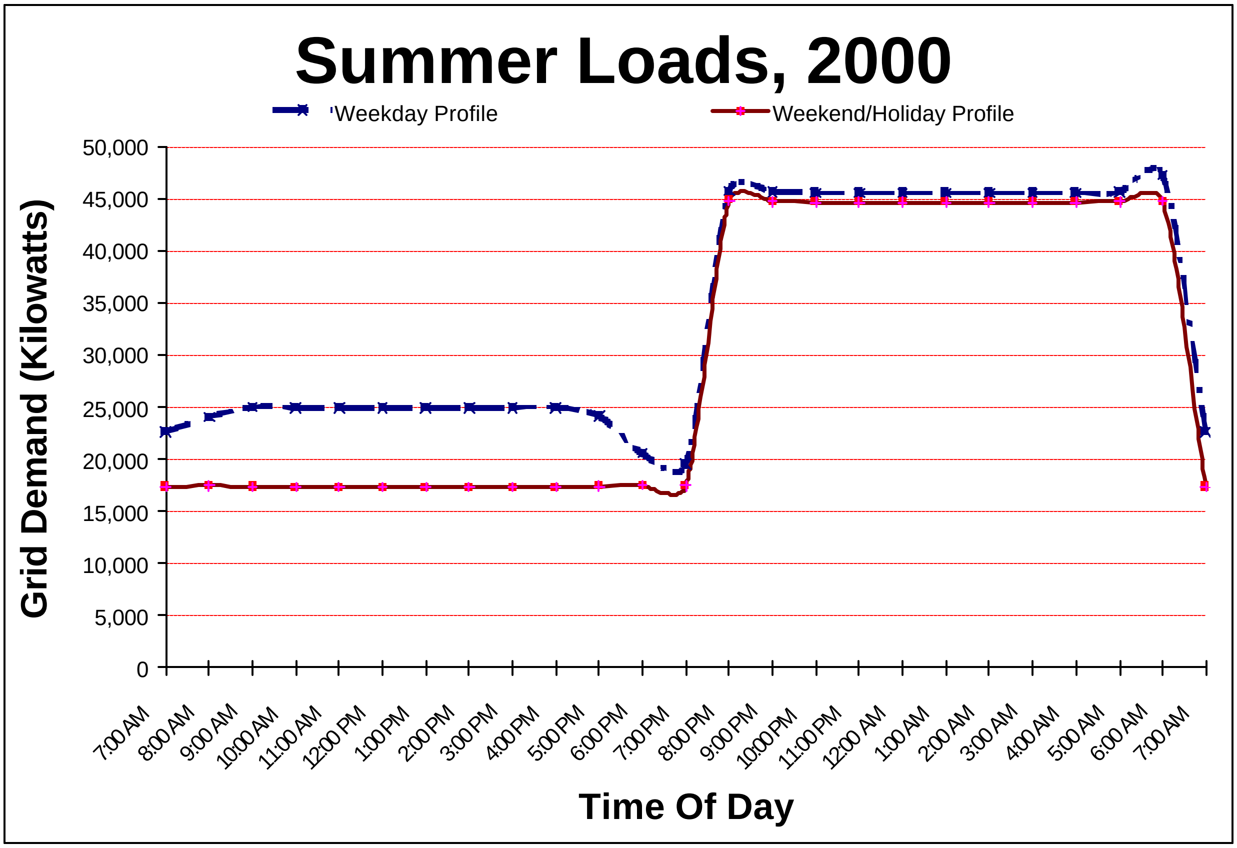
Time of Day


Winter 1996: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
60,000
50,000
40,000
30,000
20,000
10,000
0
Hours of the day


Winter 1996: Week Days
Traffic signals
Tunnel/bridge lighting
Tunnel Ventilation
Computers + Ancill.
Other process (Xrox, etc.)
building HVAC
Building Lighting
Hwy lighting
Sign lighitng
Security Lighting
Grid Demand (Kilowatts)
60,000
50,000
40,000
30,000
20,000
10,000
0
Time of Day



Summer of 2000


Summer Loads, 2000
'Weekday Profile
Weekend/Holiday Profile
Grid Demand (Kilowatts)
50,000
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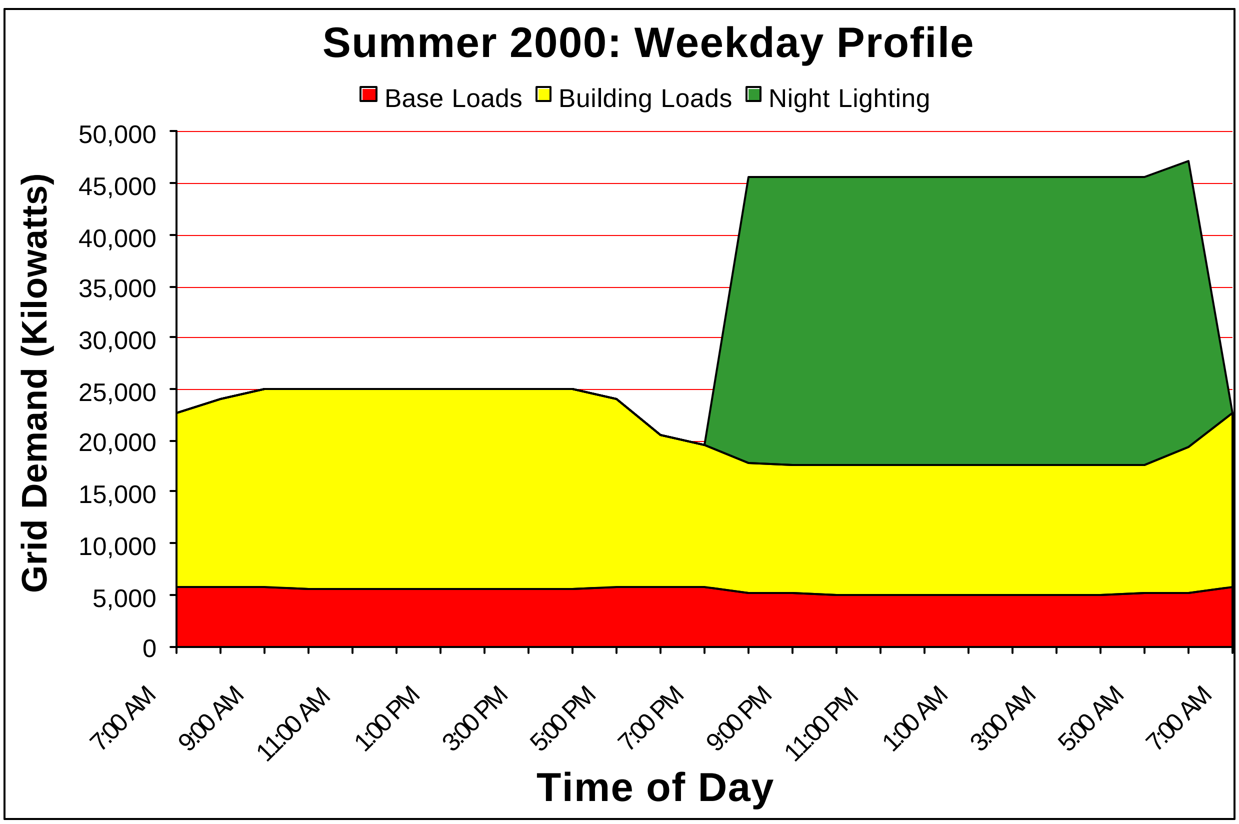
Time Of Day


Summer 2000: Weekday Profile
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
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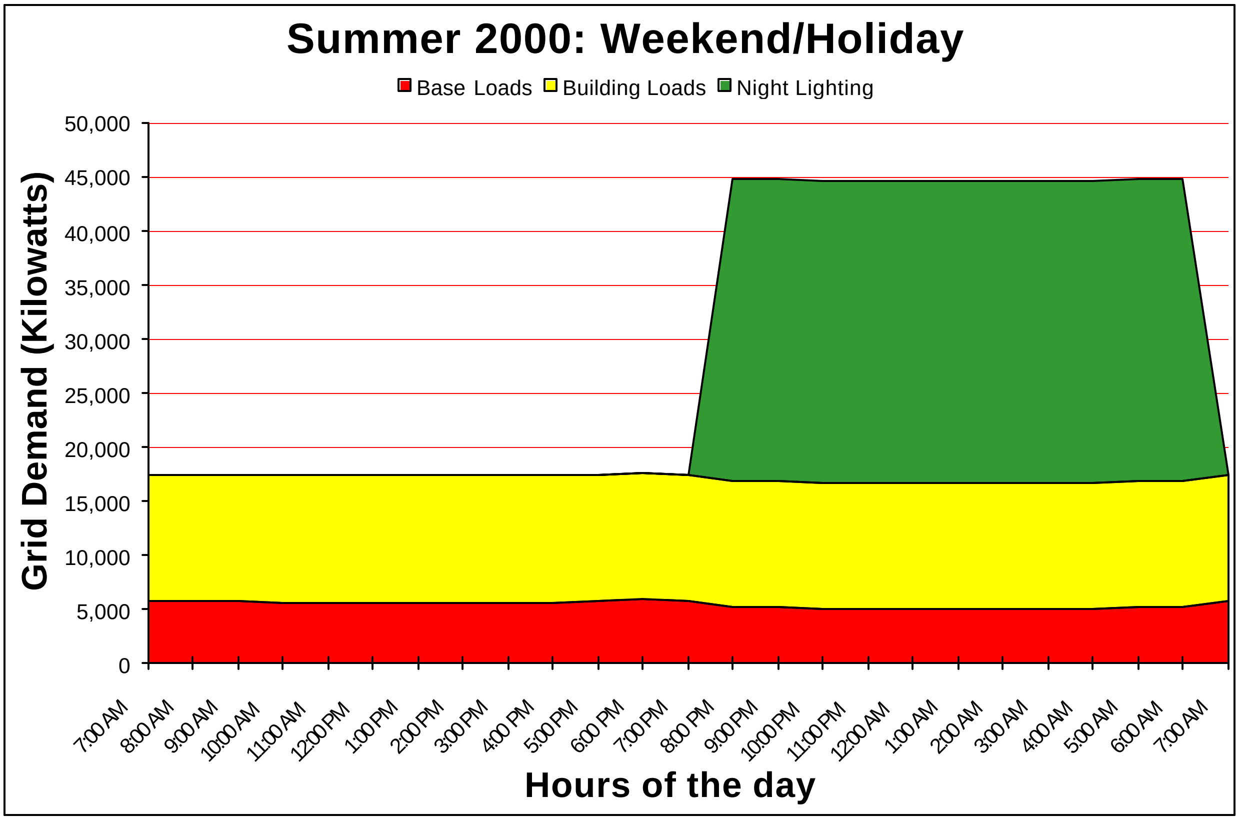
Time of Day


Summer 2000: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
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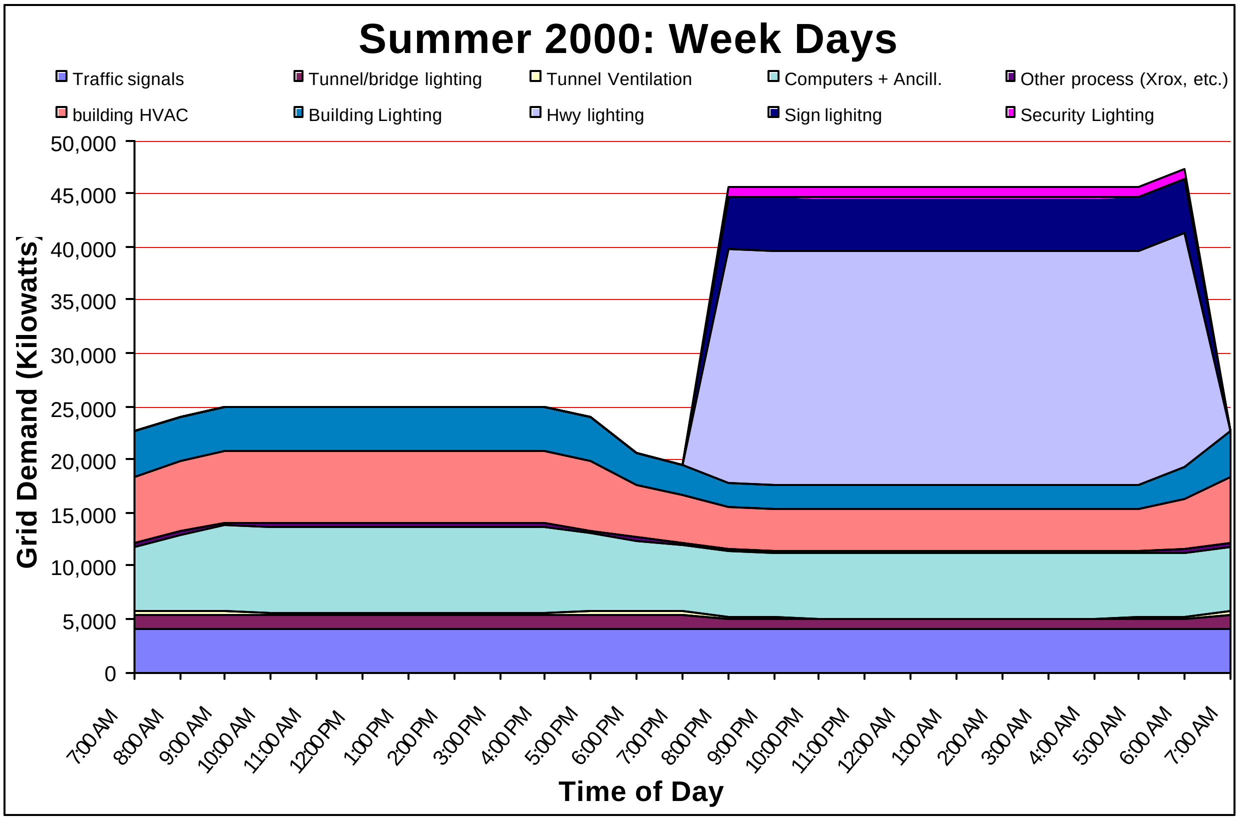
Hours of the day


Summer 2000: Week Days
Traffic signals
Tunnel/bridge lighting
Tunnel Ventilation
Computers + Ancill.
Other process (Xrox, etc.)
building HVAC
Building Lighting
Hwy lighting
Sign lighitng
Security Lighting
Grid Demand (Kilowatts)
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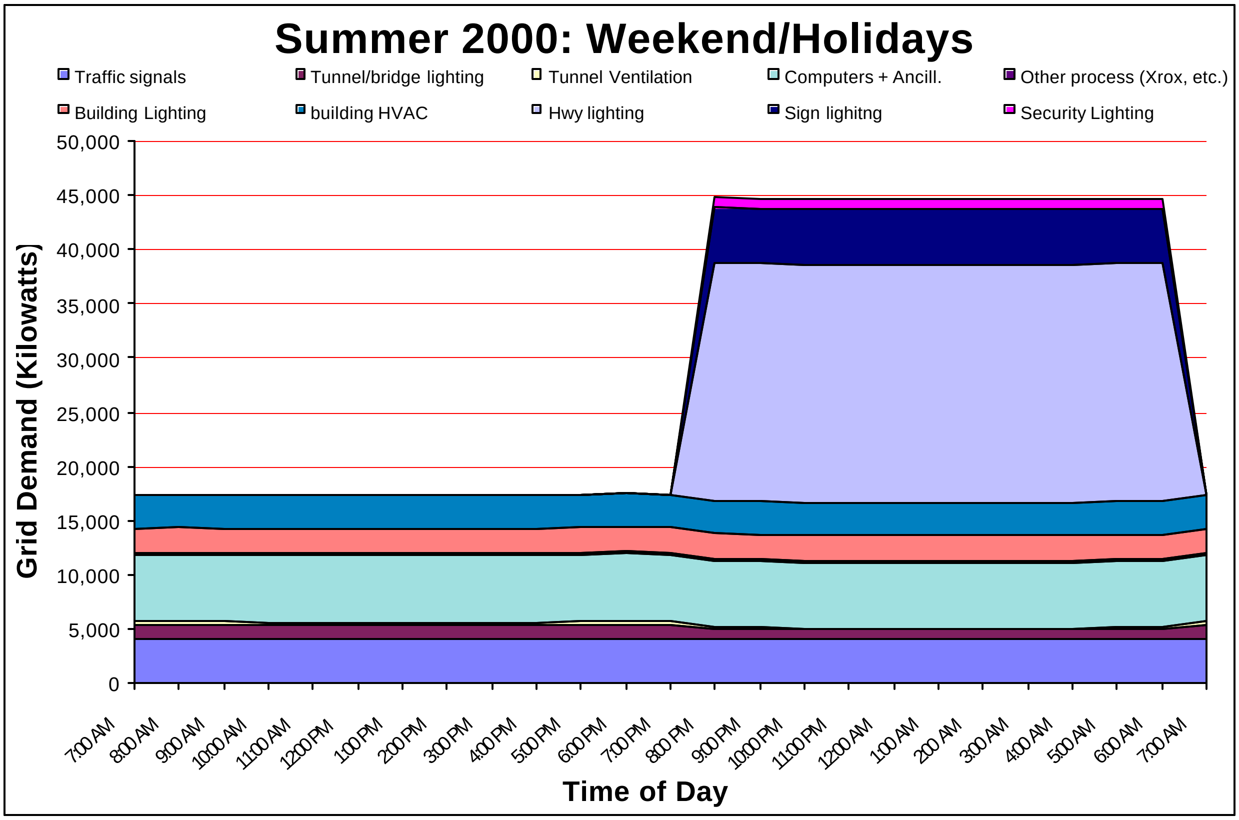
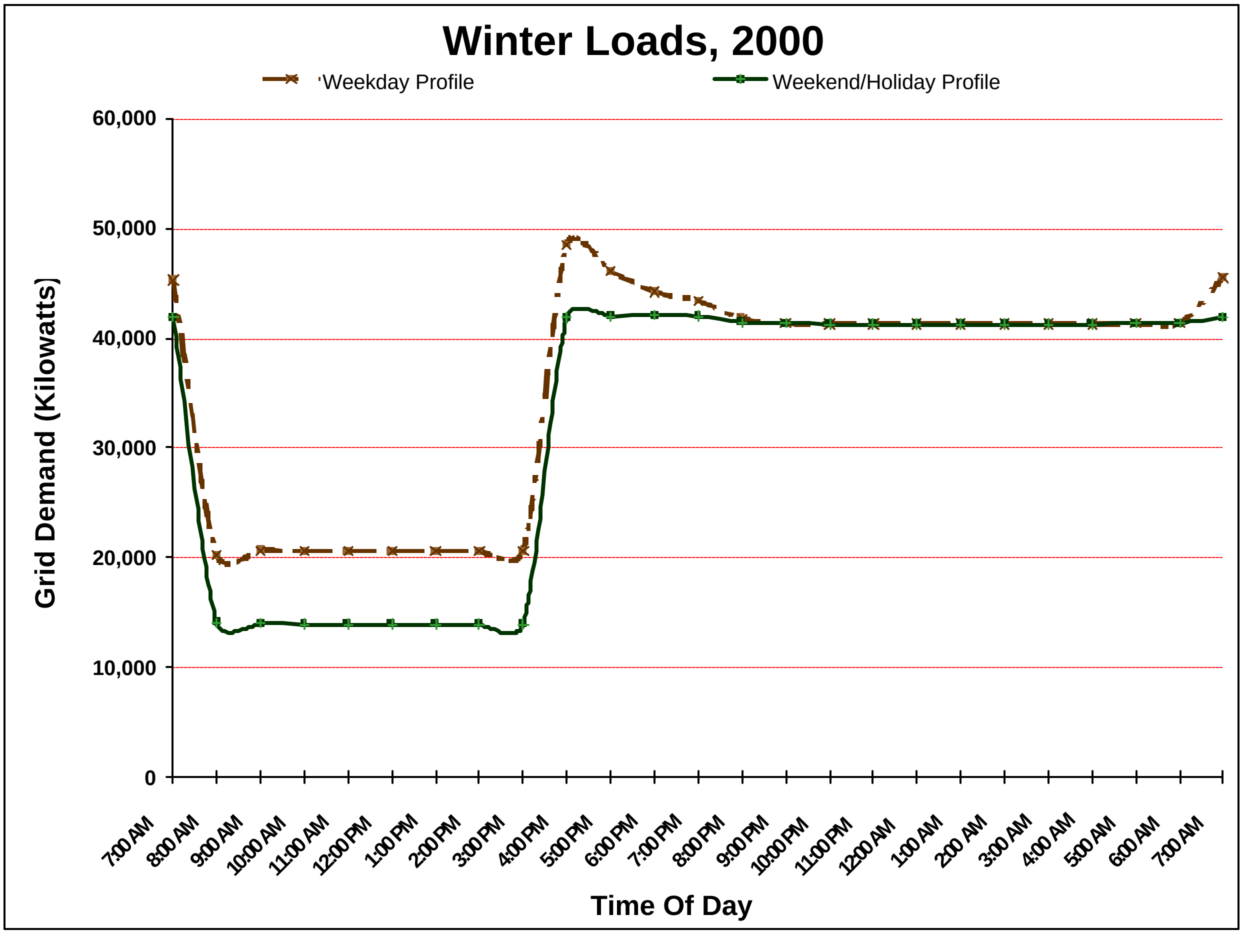
Time of Day



Winter of 2000


Winter Loads, 2000
Weekday Profile
Weekend/Holiday Profile
Grid Demand (Kilowatts)
60,000
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30,000
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10,000
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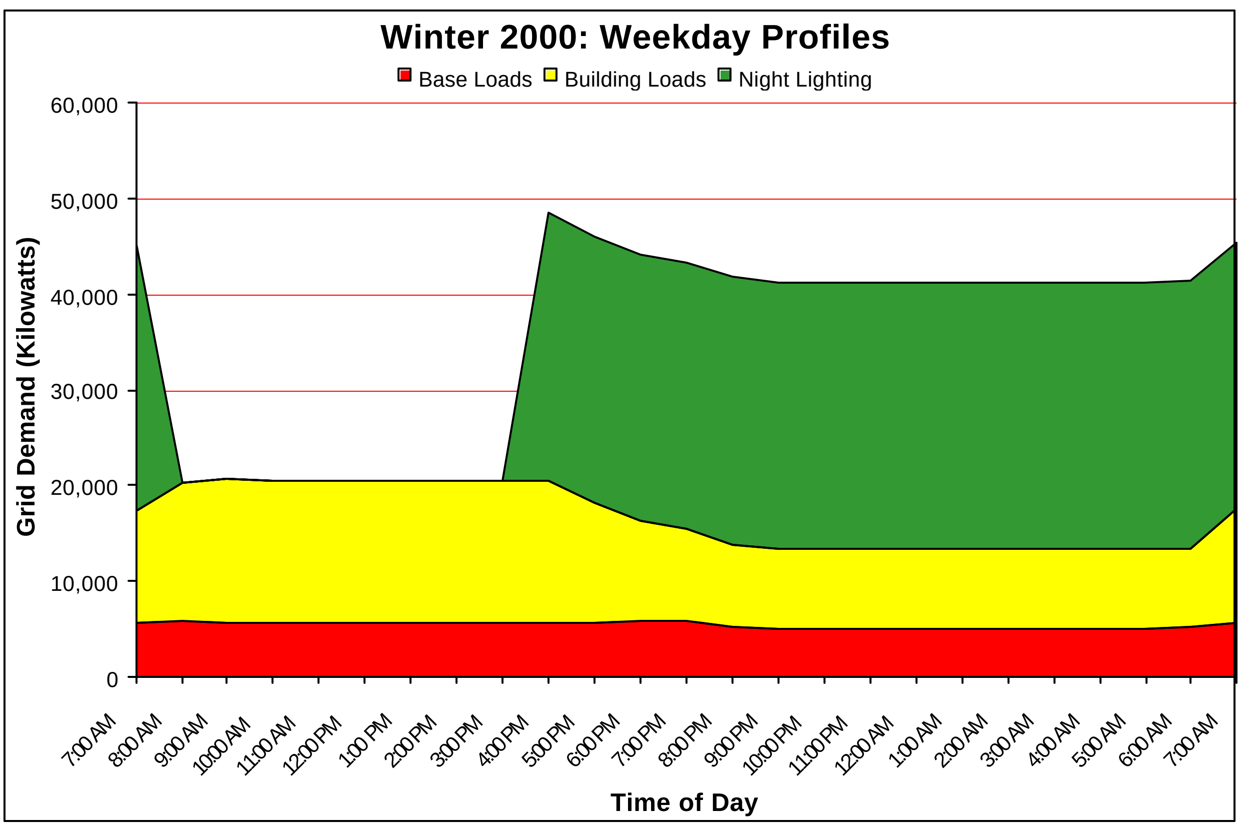
7:00 AM 8:00 AM 9:00 AM 10:00 AM 11:00 AM 12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM 6:00 PM 7:00 PM 8:00 PM 9:00 PM 10:00 PM 11:00 PM 12:00 AM 1:00 AM 2:00 AM 3:00 AM 4:00 AM 5:00 AM 6:00 AM 7:00 AM
Time Of Day


Winter 2000: Weekday Profiles
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
60,000
50,000
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30,000
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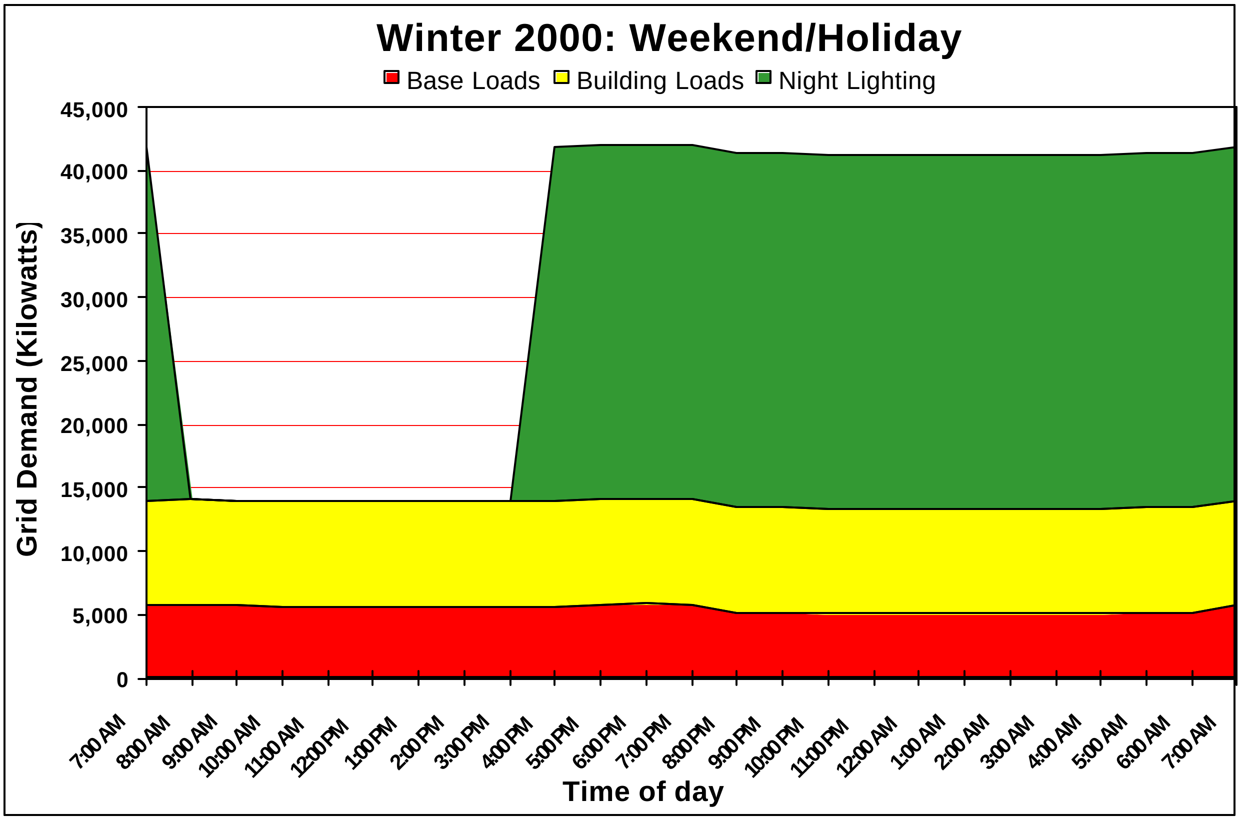
7:00 AM 8:00 AM 9:00 AM 10:00 AM 11:00 AM 12:00 PM 1:00 PM 2:00 PM 3:00 PM 4:00 PM 5:00 PM 6:00 PM 7:00 PM 8:00 PM 9:00 PM 10:00 PM 11:00 PM 12:00 AM 1:00 AM 2:00 AM 3:00 AM 4:00 AM 5:00 AM 6:00 AM 7:00 AM
Time of Day


Winter 2000: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
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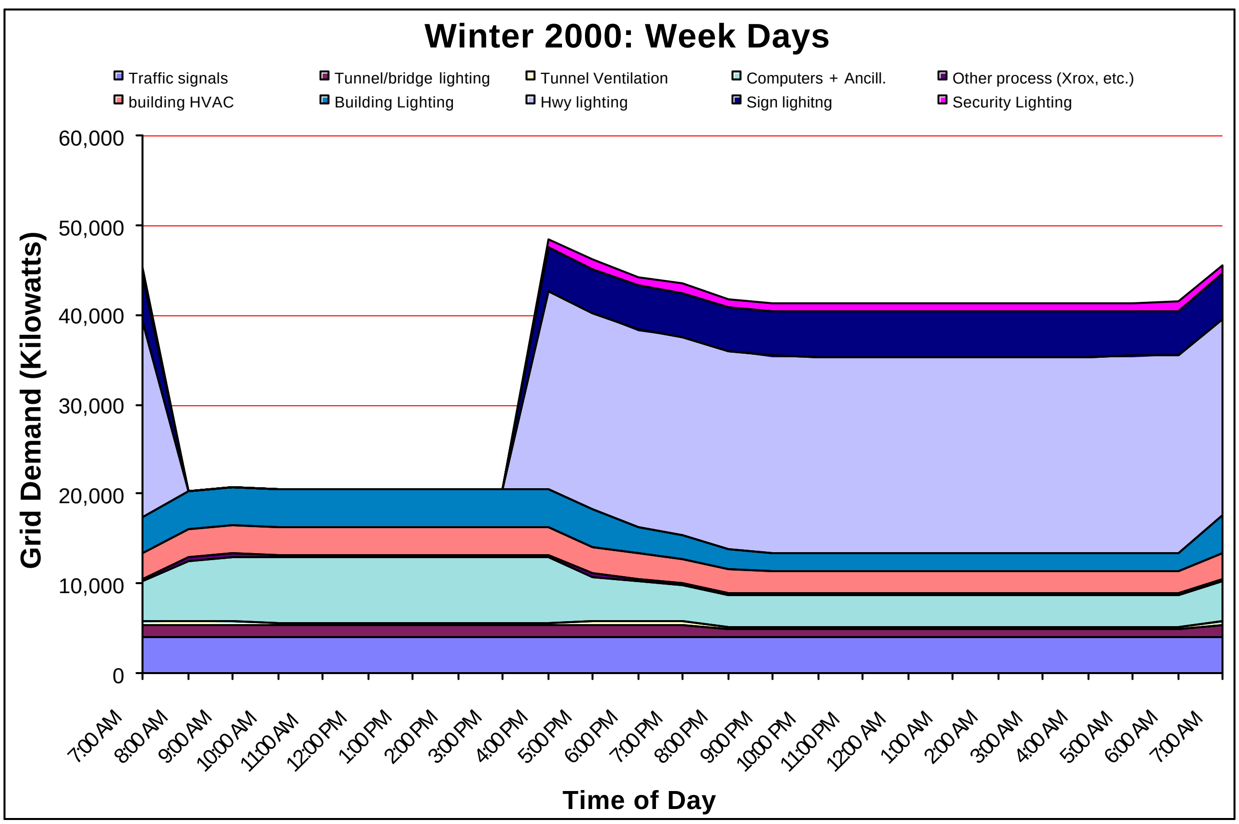
Time of day


Winter 2000: Week Days
Traffic signals
Tunnel/bridge lighting
Tunnel Ventilation
Computers + Ancill.
Other process (Xrox, etc.)
building HVAC
Building Lighting
Hwy lighting
Sign lighitng
Security Lighting
Grid Demand (Kilowatts)
60,000
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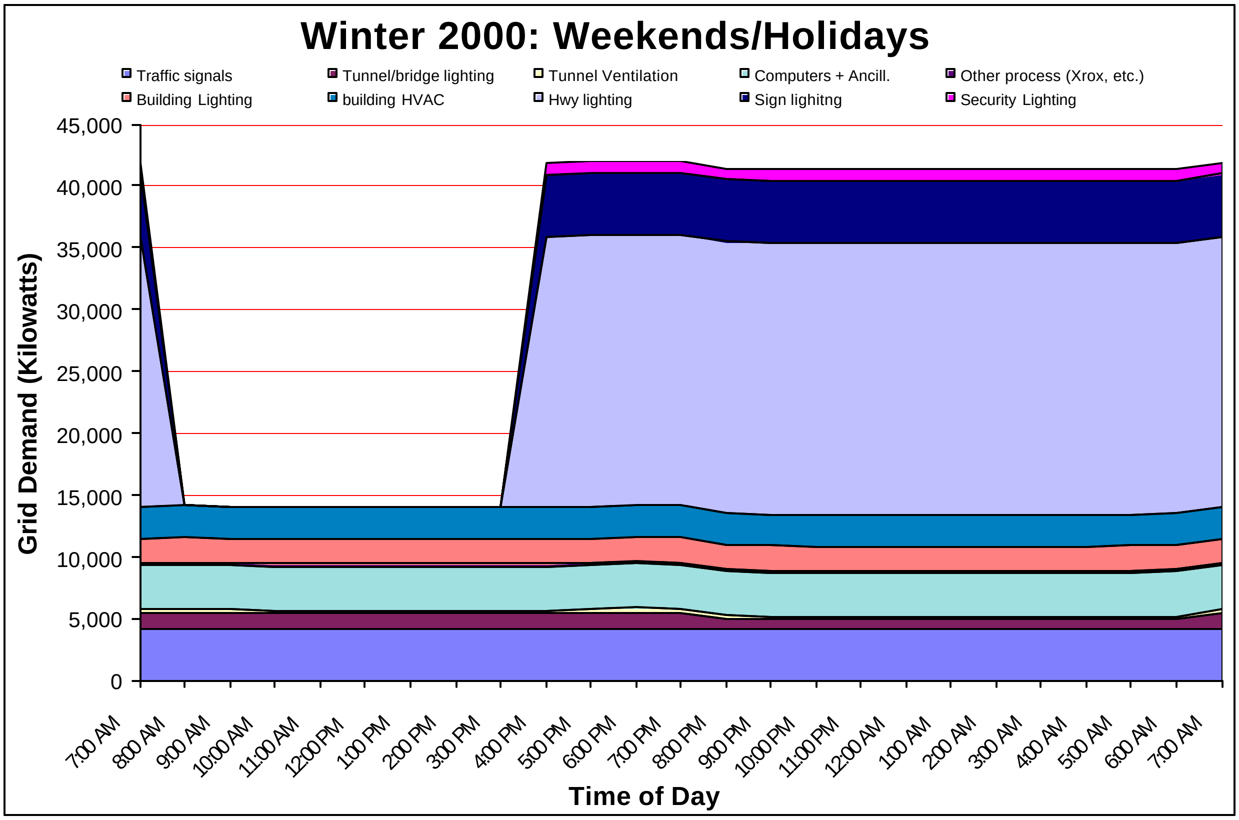
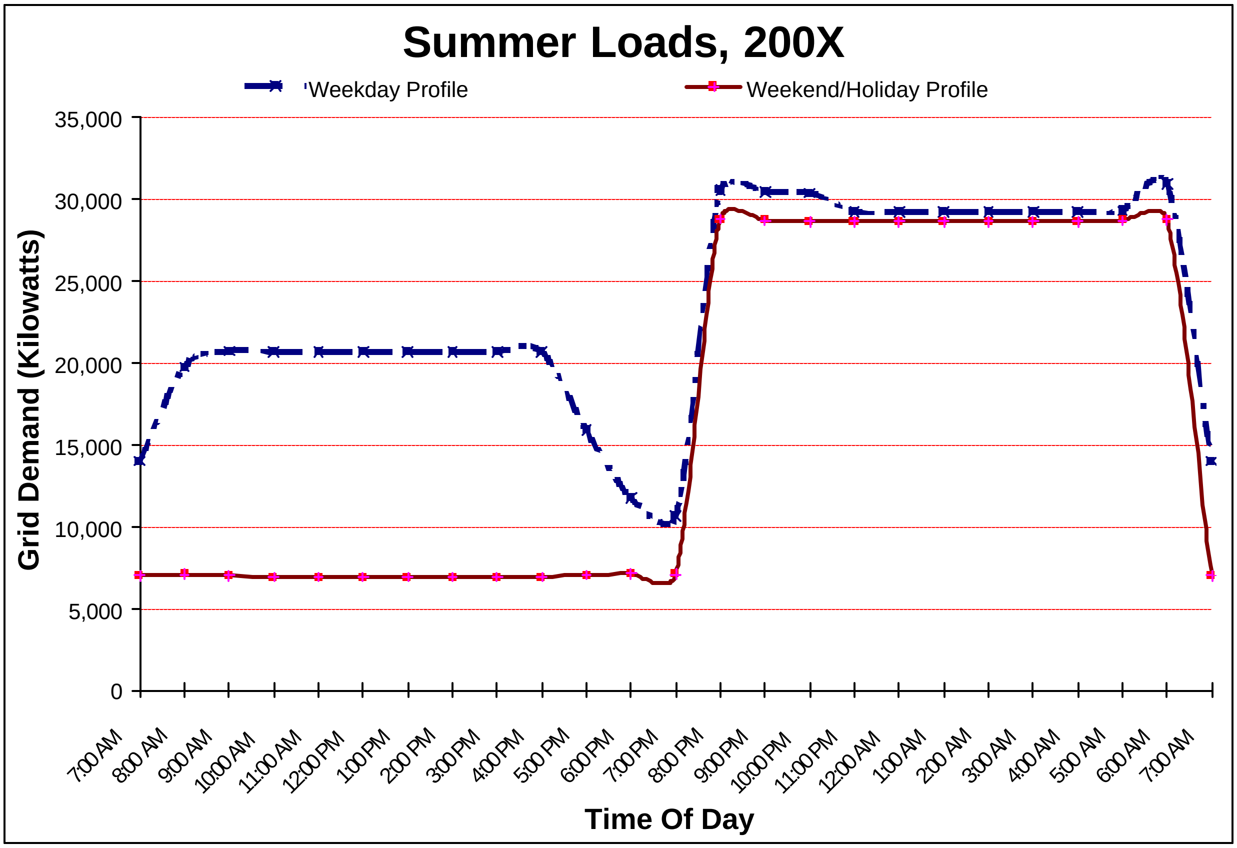
Time of Day



Summer of 200X


Summer Loads, 200X
'Weekday Profile
Weekend/Holiday Profile
Grid Demand (Kilowatts)
35,000
30,000
25,000
20,000
15,000
10,000
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7:00 AM
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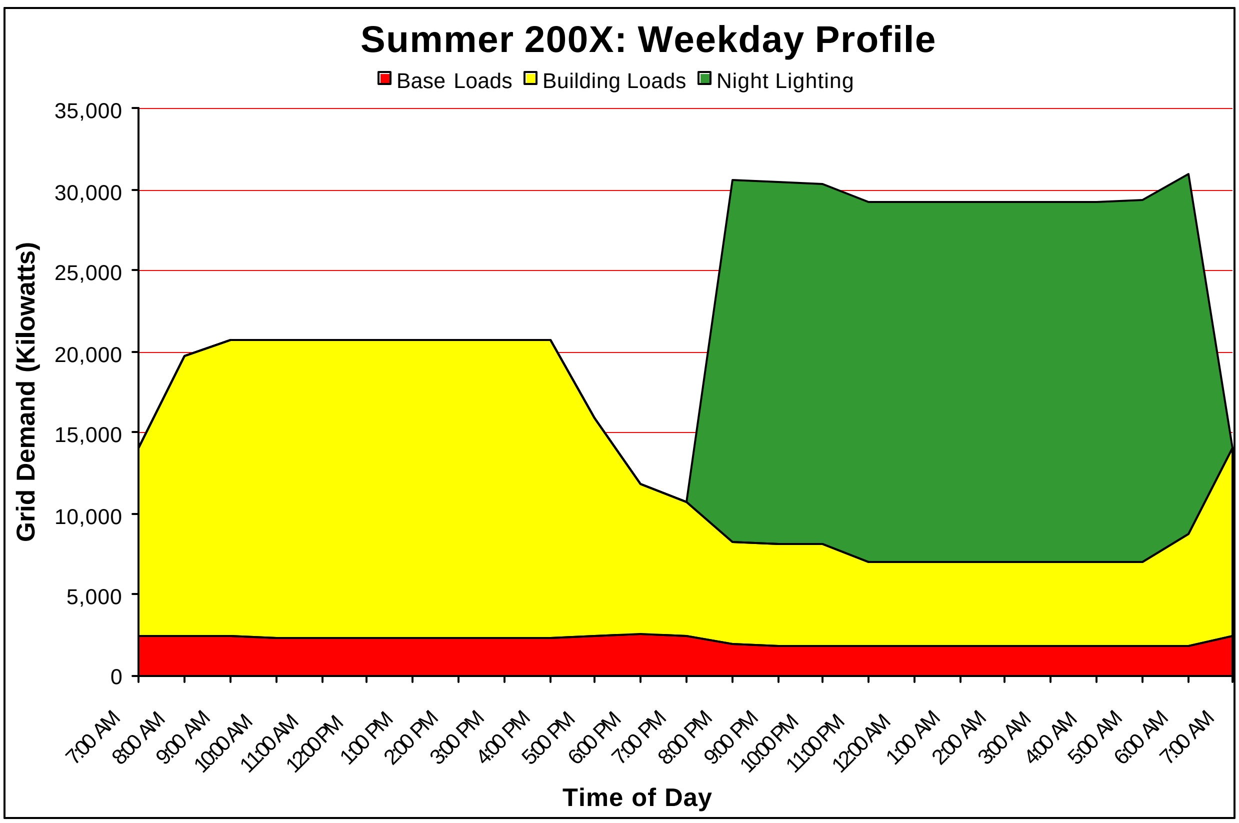
7:00 AM
Time Of Day


Summer 200X: Weekday Profile
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
35,000
30,000
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7:00 AM
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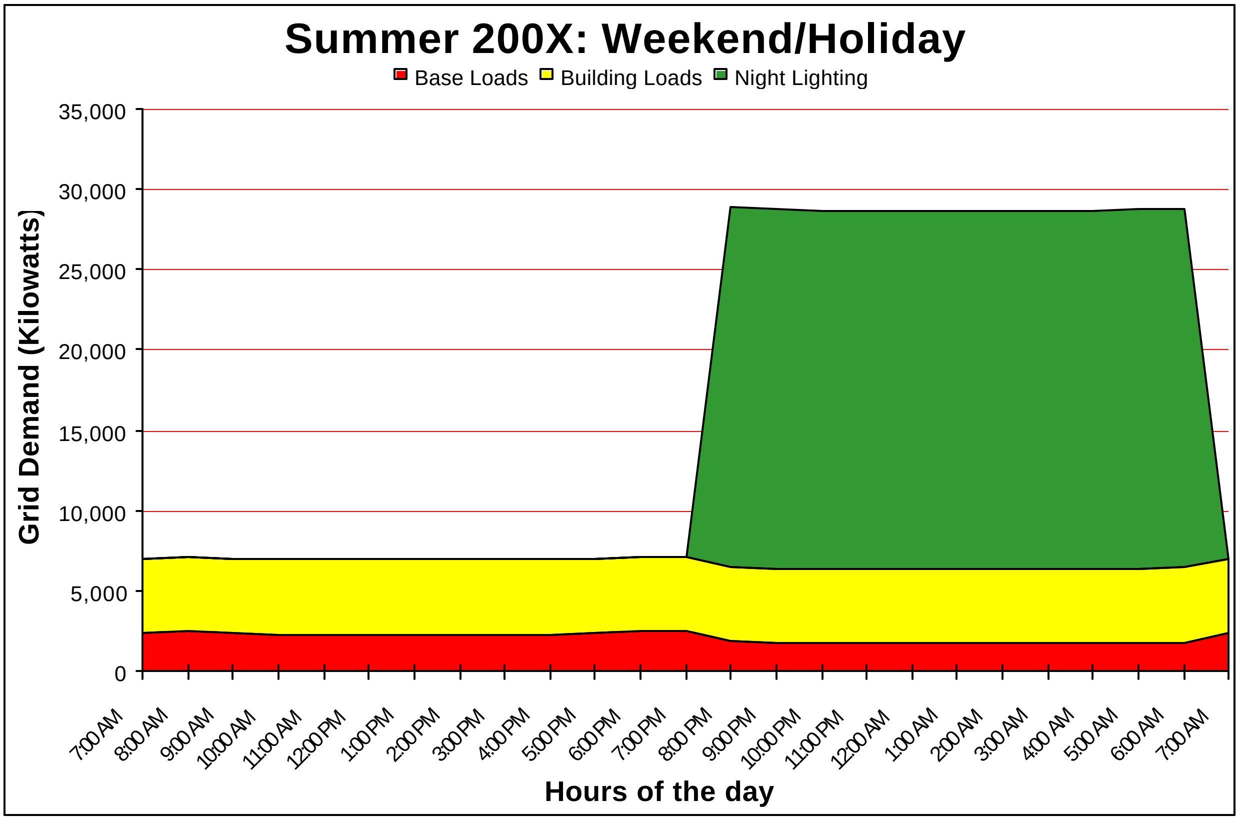
6:00 AM
7:00 AM
Time of Day



Summer 200X: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
35,000
30,000
25,000
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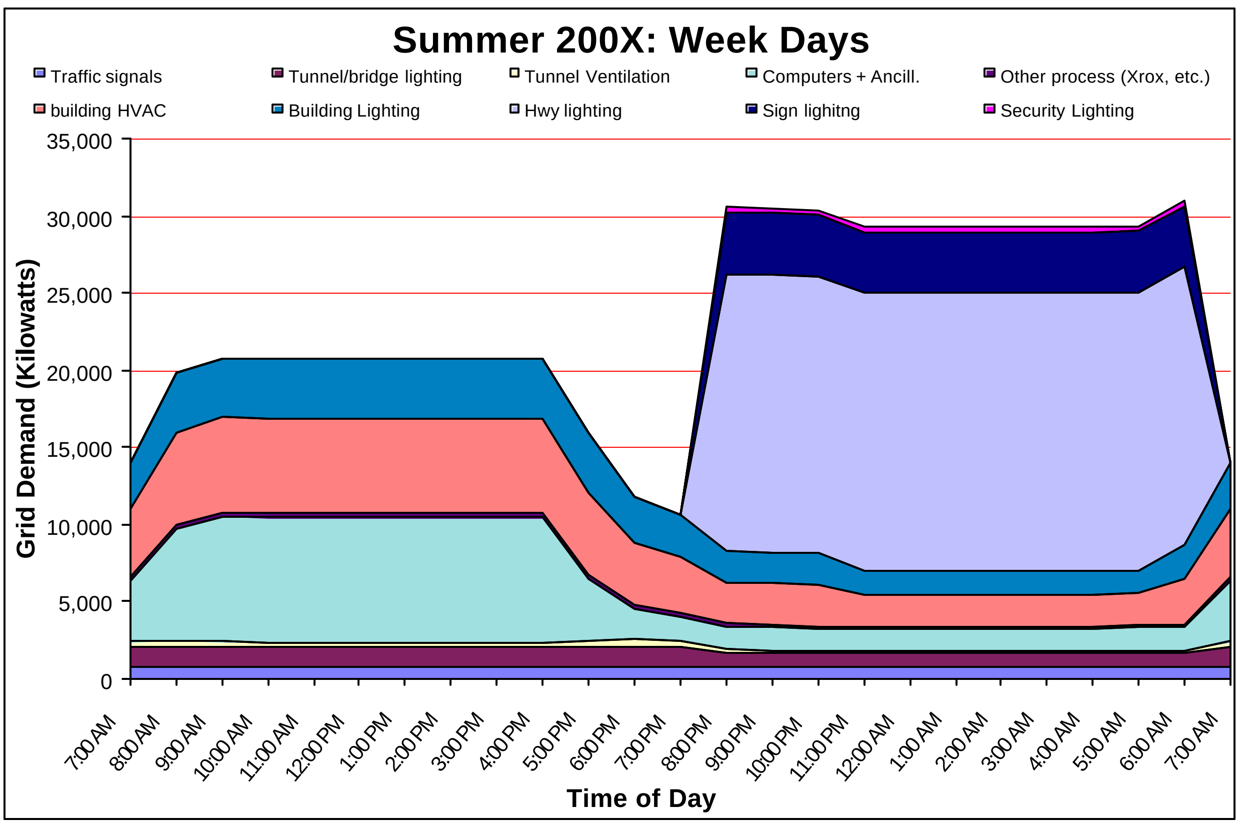
Hours of the day



Summer 200X: Week Days
Traffic signals
Tunnel/bridge lighting
Tunnel Ventilation
Computers + Ancill.
Other process (Xrox, etc.)
building HVAC
Building Lighting
Hwy lighting
Sign lighitng
Security Lighting
Grid Demand (Kilowatts)
35,000
30,000
25,000
20,000
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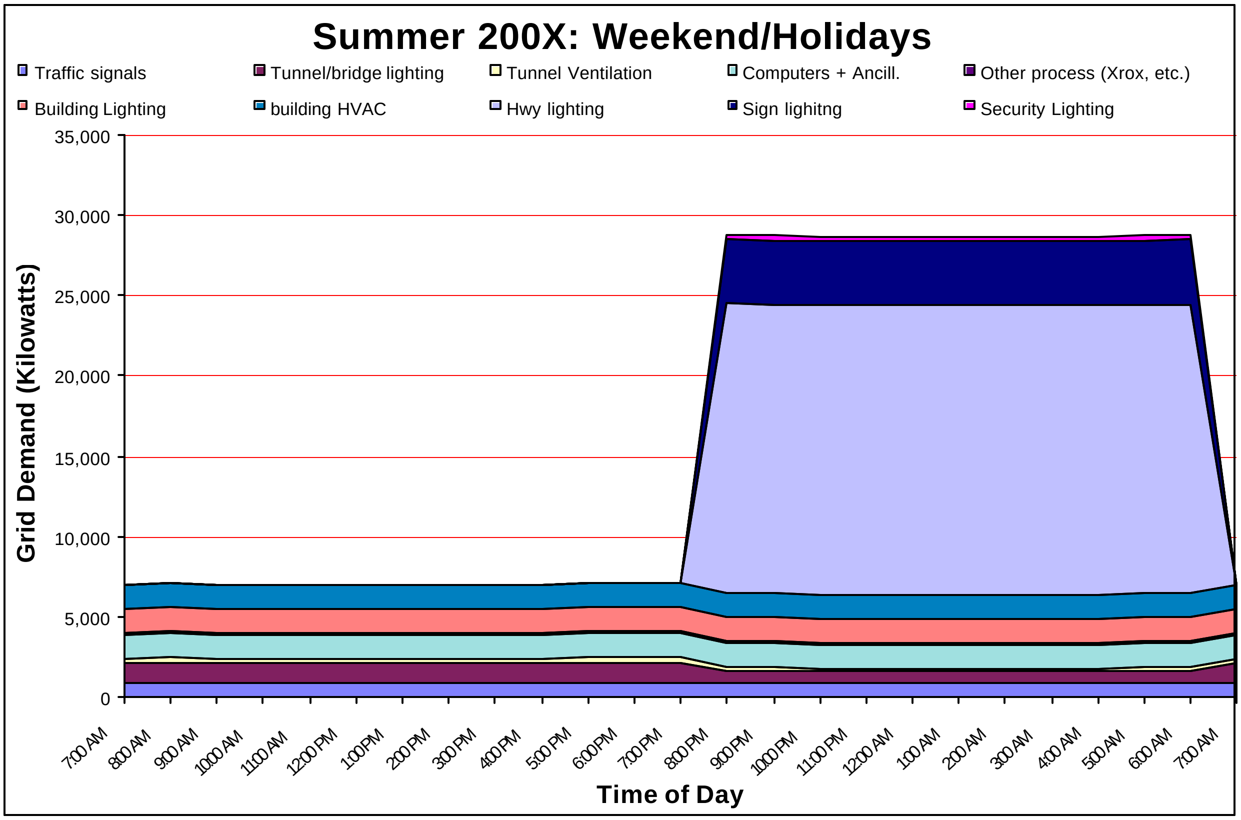
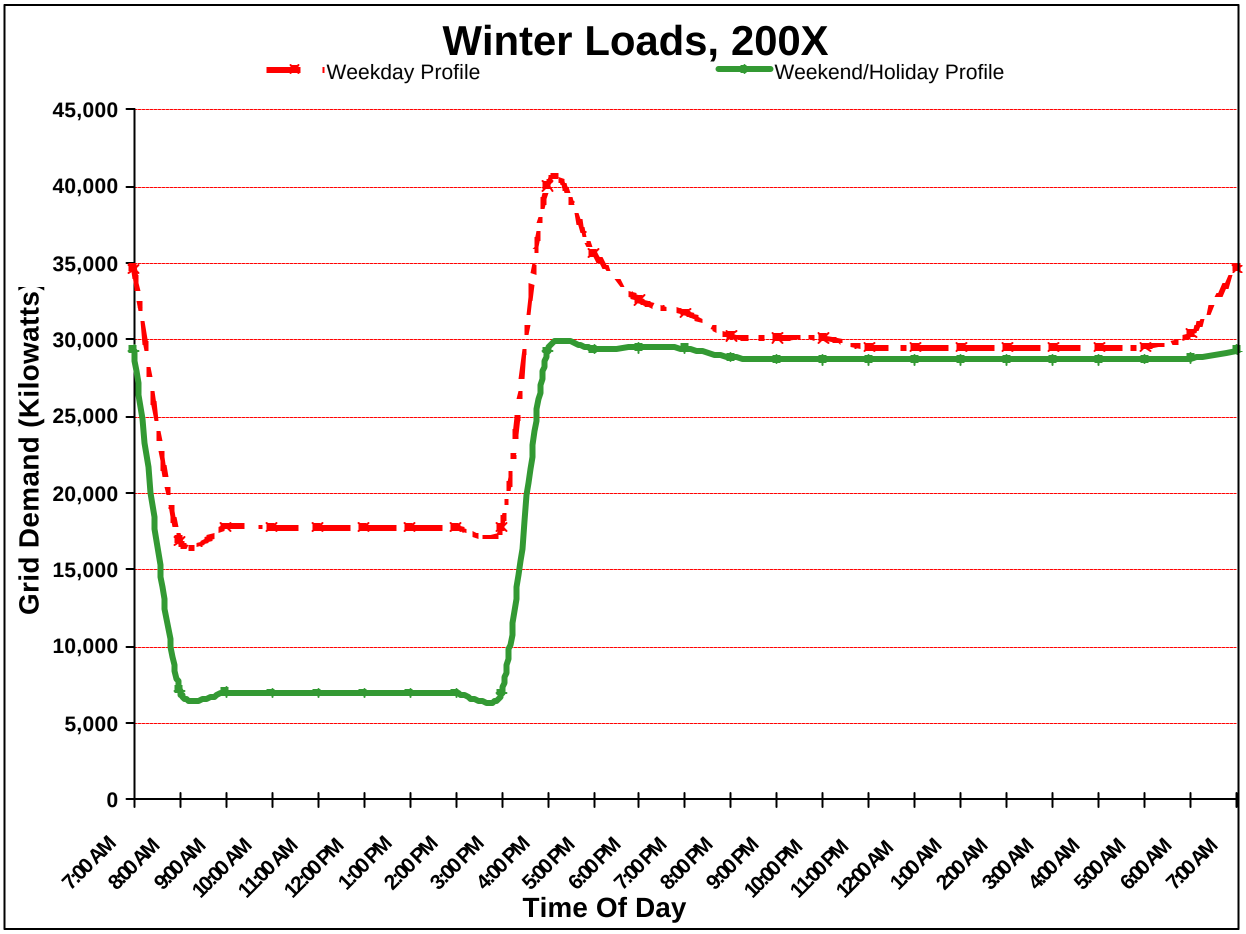
Time of Day



Winter of 200X


Winter Loads, 200X
Weekday Profile
Weekend/Holiday Profile
Grid Demand (Kilowatts)
45,000
40,000
35,000
30,000
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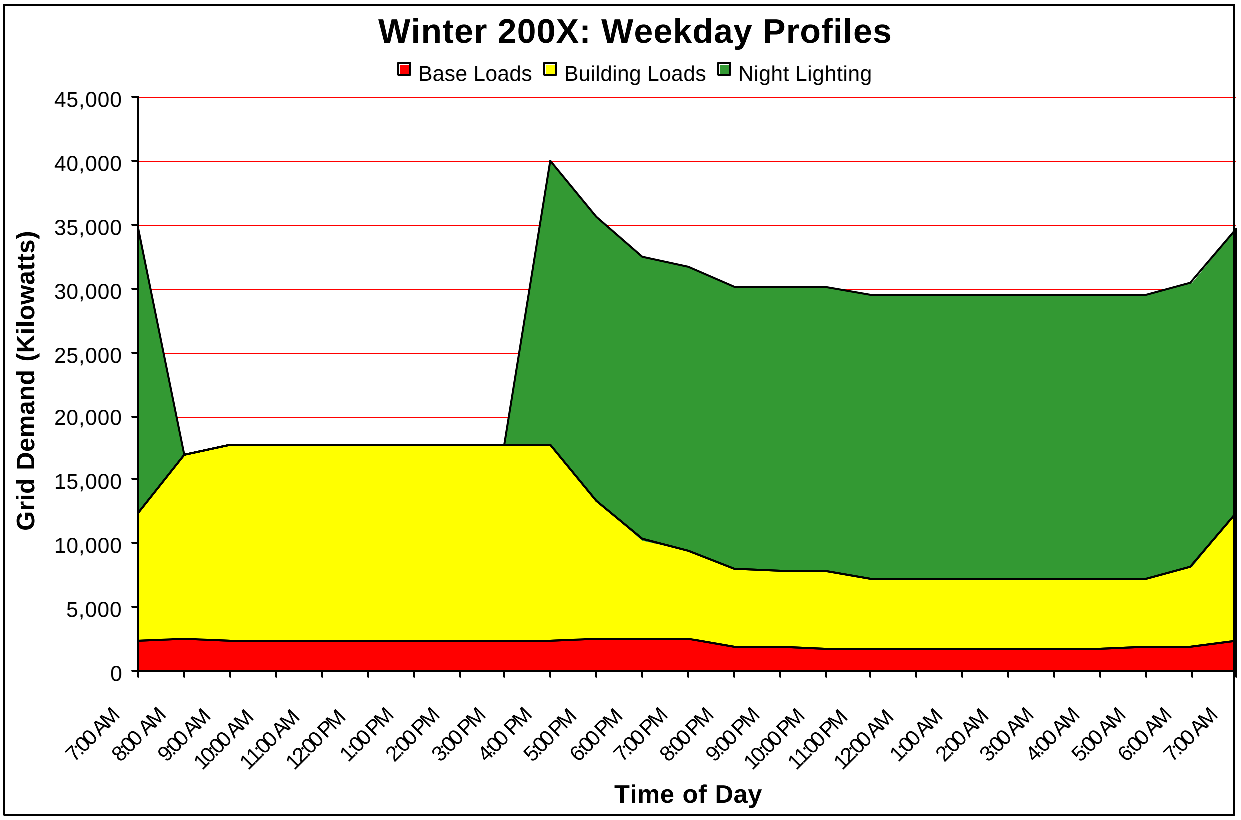
Time Of Day


Winter 200X: Weekday Profiles
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
45,000
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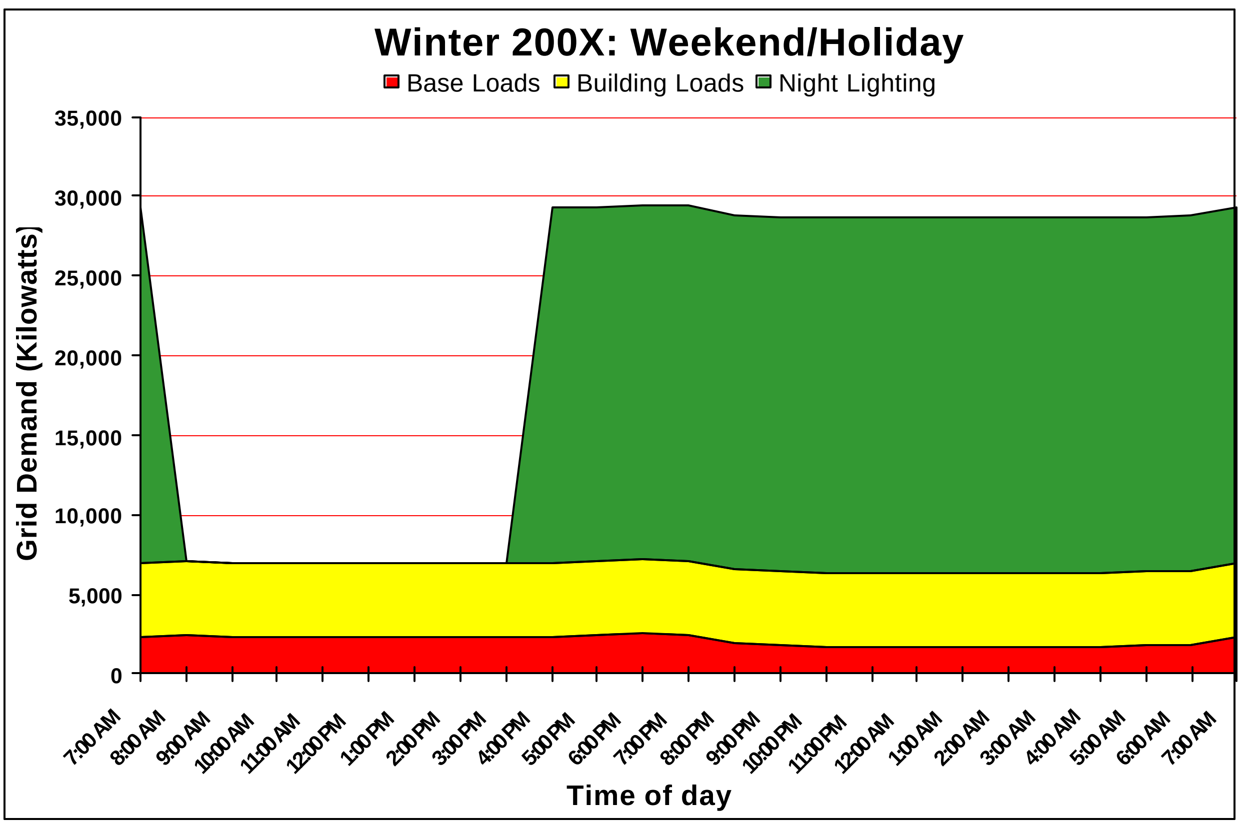
Time of Day


Winter 200X: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
35,000
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7:00 AM
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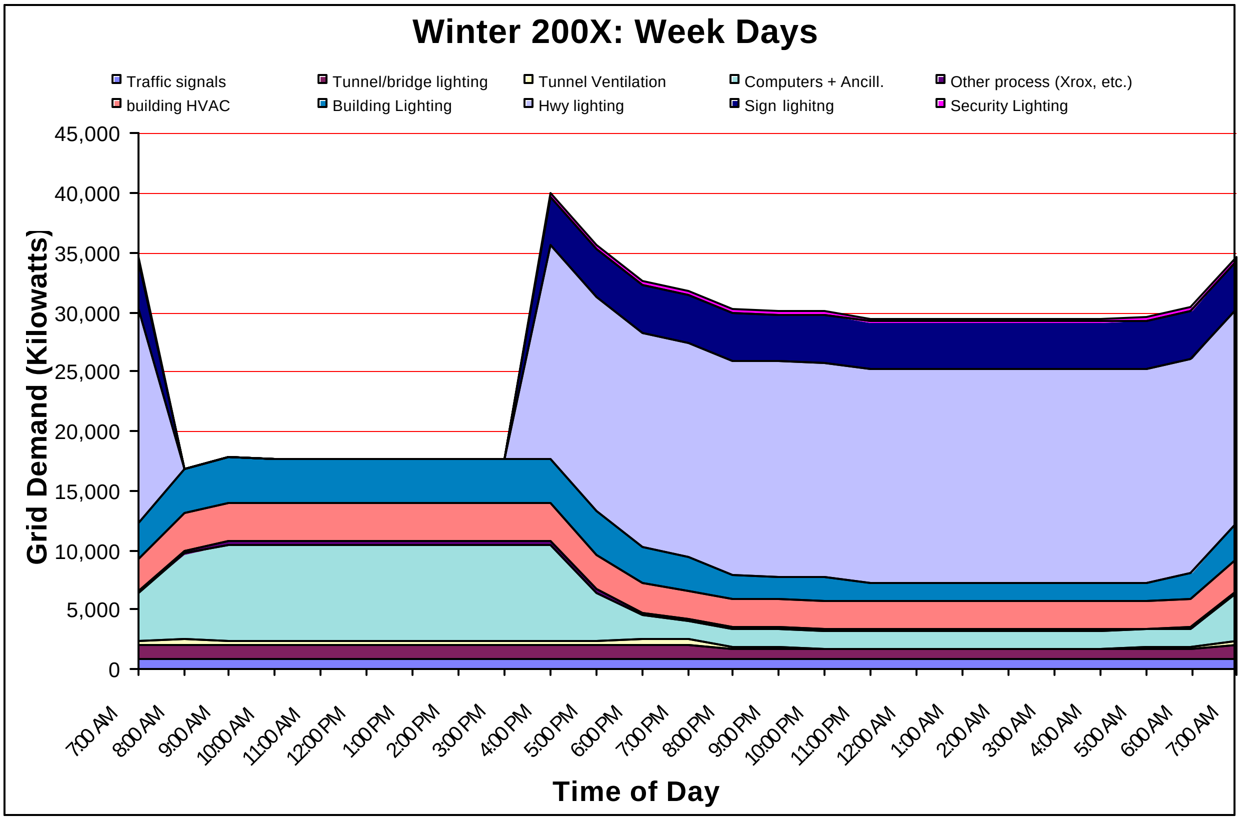
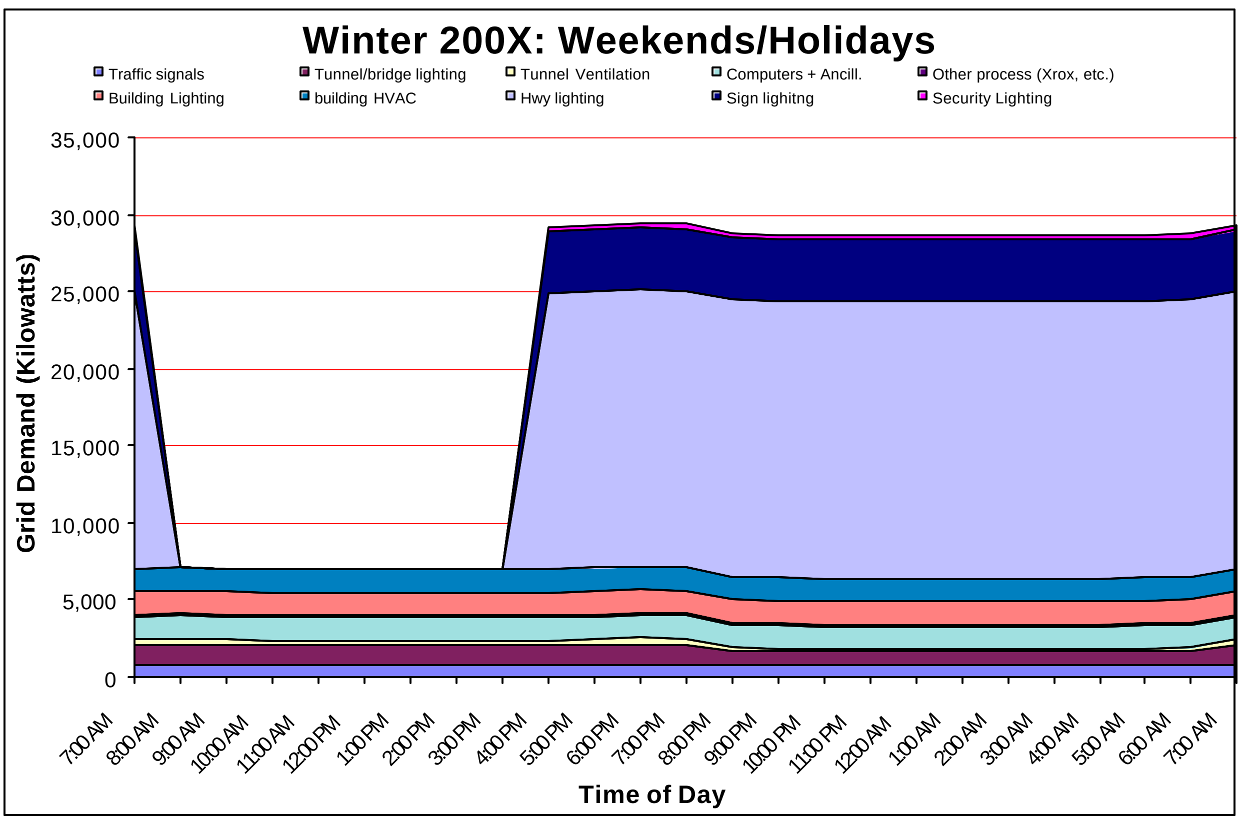
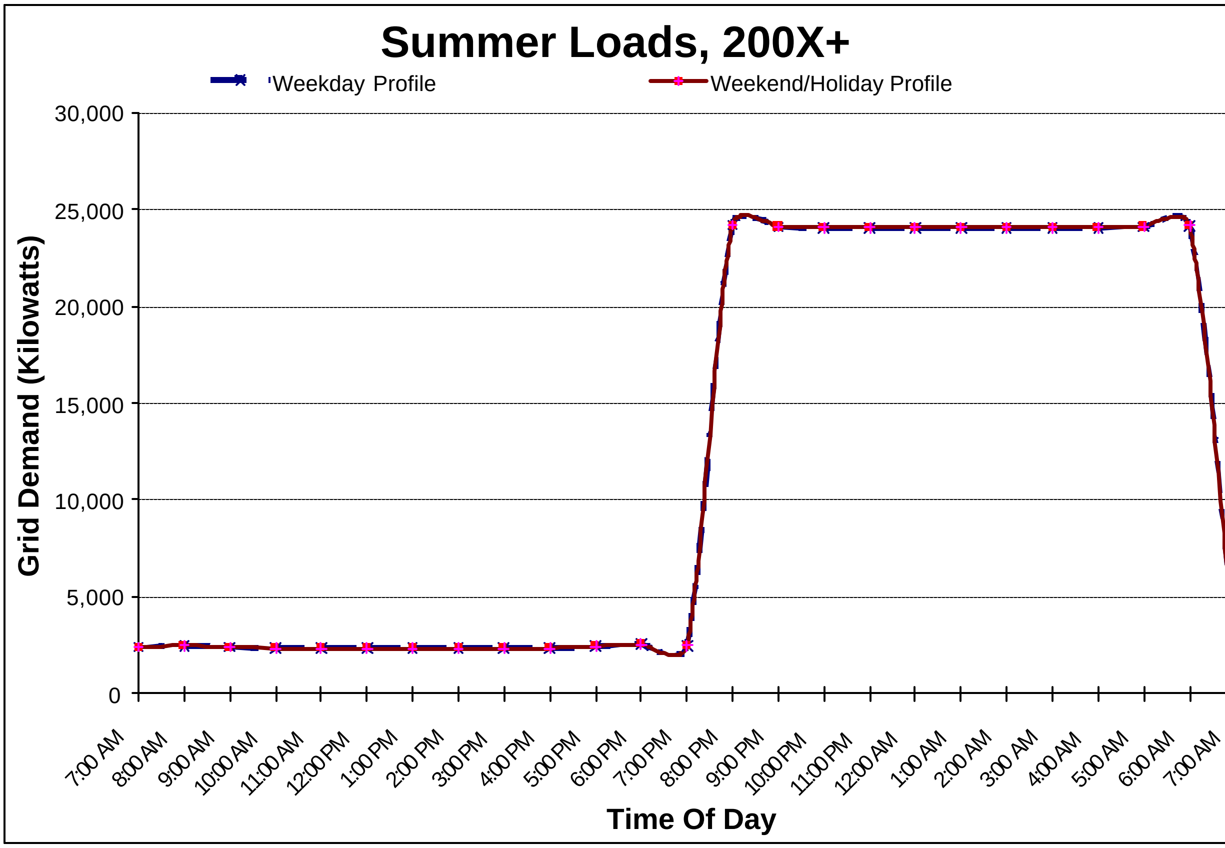
Time of day





Summer of 200X+



Summer Loads, 200X+
'Weekday Profile
Weekend/Holiday Profile
Grid Demand (Kilowatts)
30,000
25,000
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5,000
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7:00 AM
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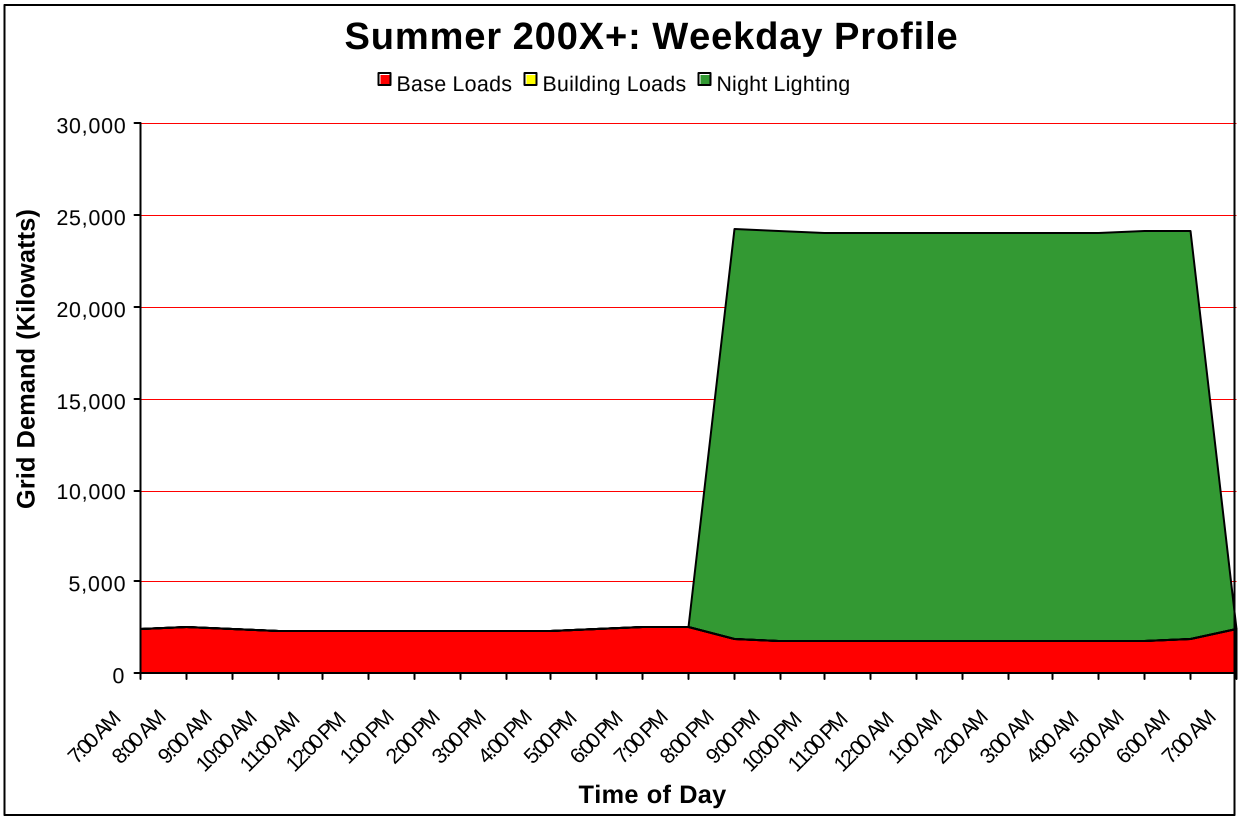
Summary 200X+: Weekday Profile
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
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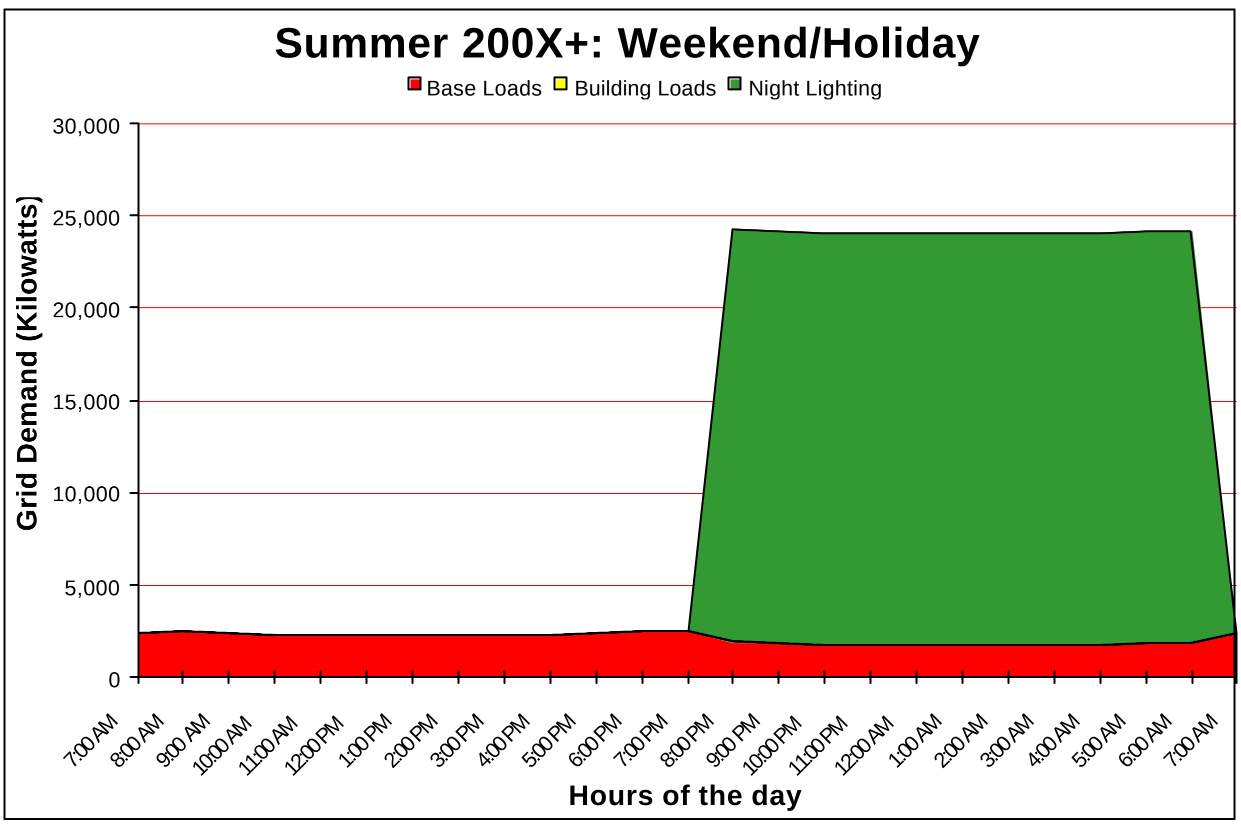
Summer 200X+: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
Grid Demand (Kilowatts)
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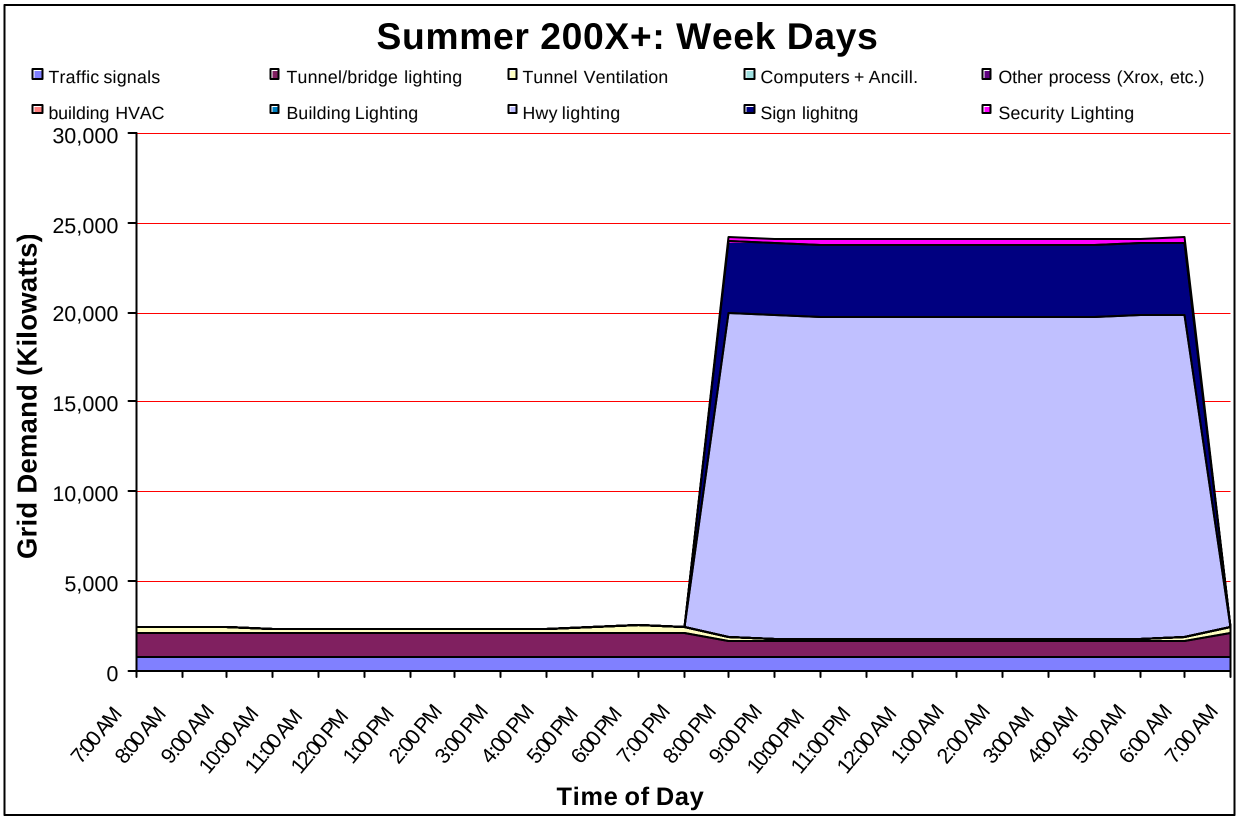
Hours of the day



Summer 200X+: Week Days
Traffic signals
Tunnel/bridge lighting
Tunnel Ventilation
Computers + Ancill.
Other process (Xrox, etc.)
building HVAC
Building Lighting
Hwy lighting
Sign lighitng
Security Lighting
Grid Demand (Kilowatts)
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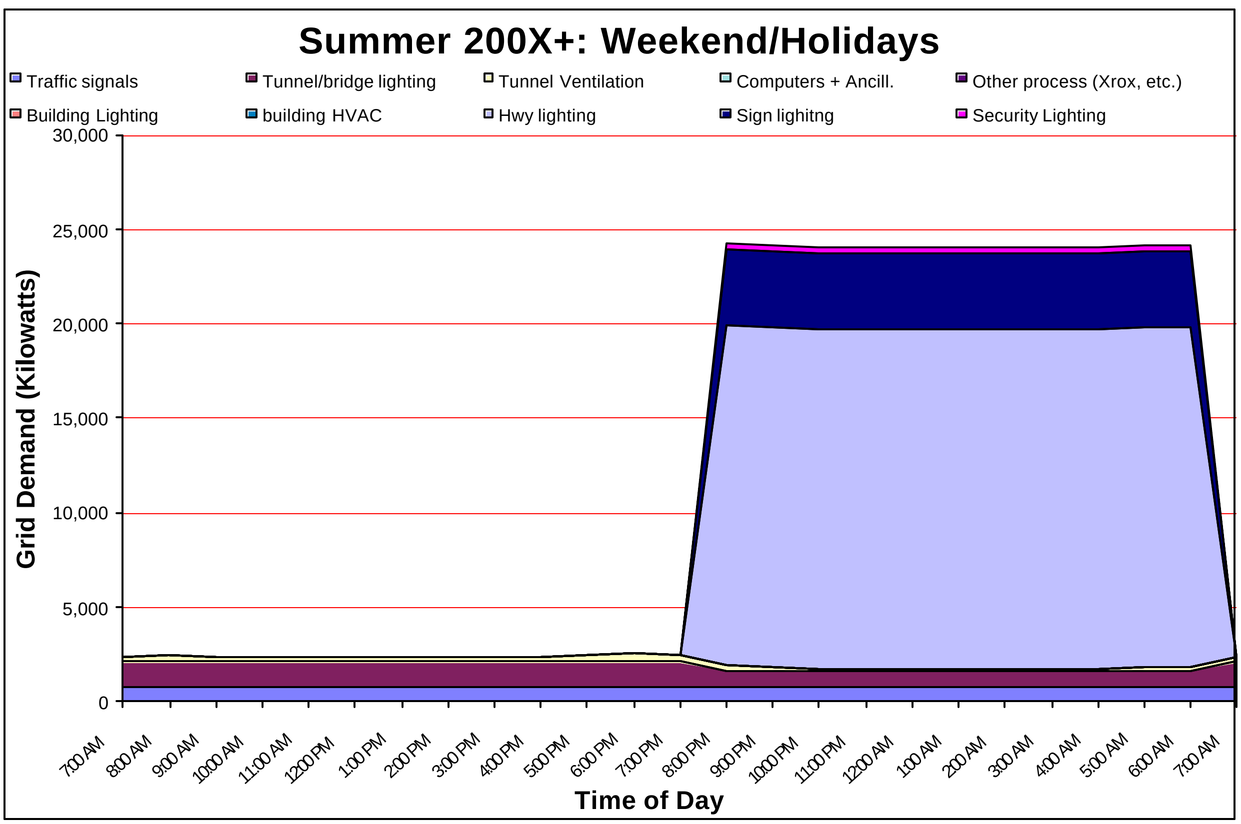
Time of Day



Summer 200X+: Weekend/Holidays
Traffic signals
Tunnel/bridge lighting
Tunnel Ventilation
Computers + Ancill.
Other process (Xrox, etc.)
Building Lighting
building HVAC
Hwy lighting
Sign lighitng
Security Lighting
Grid Demand (Kilowatts)
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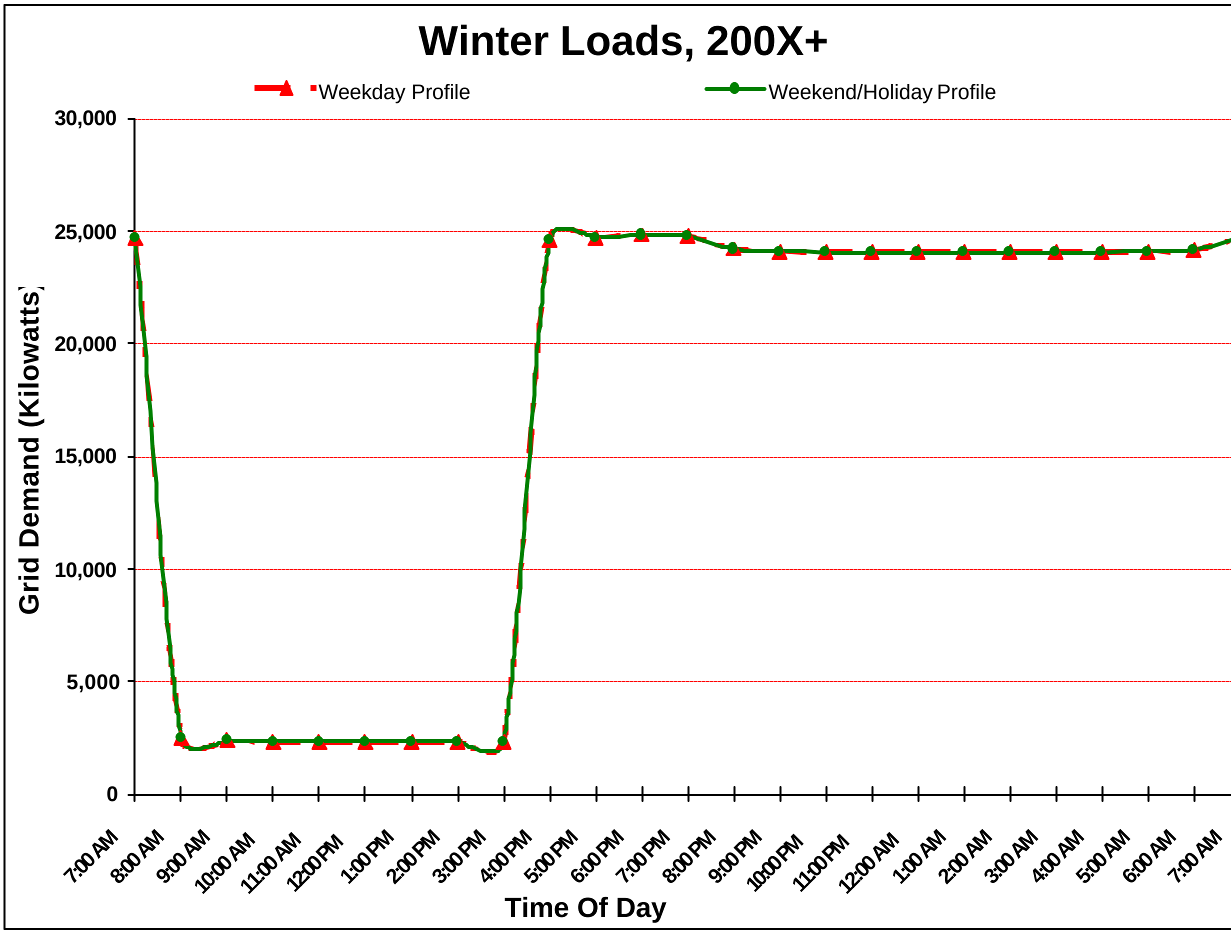
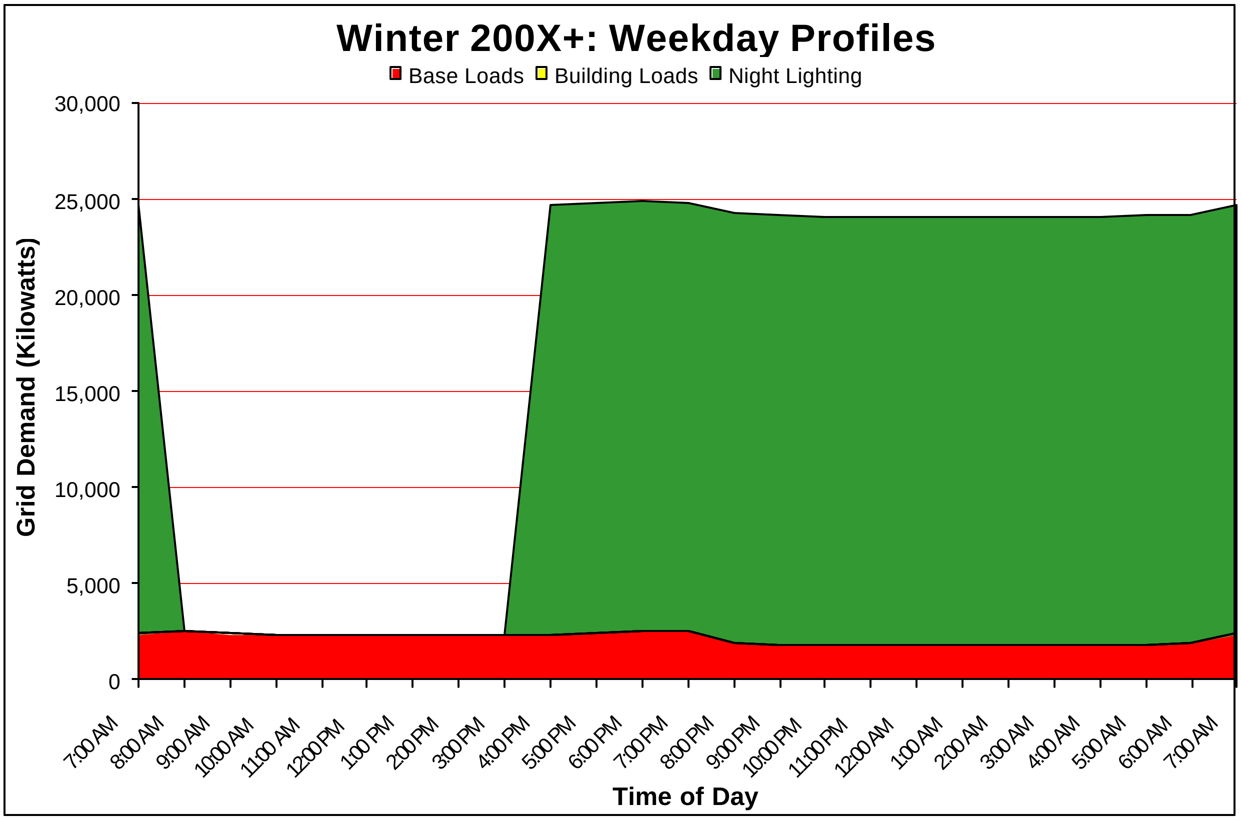
Winter of 200X+




Winter 200X+: Weekday Profiles
Base Loads
Building Loads
Night Lighting
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Grid Demand (Kilowatts)
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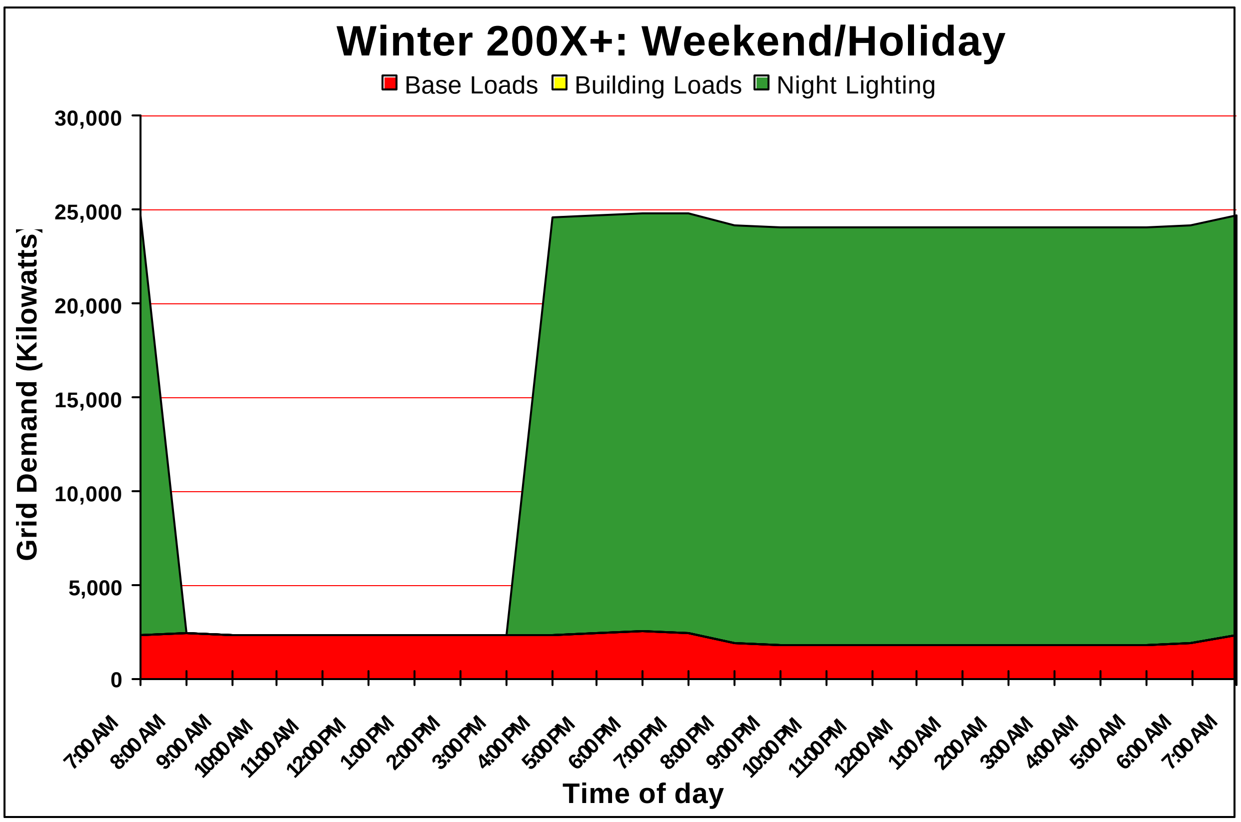
Winter 200X+: Weekend/Holiday
Base Loads
Building Loads
Night Lighting
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Grid Demand (Kilowatts)
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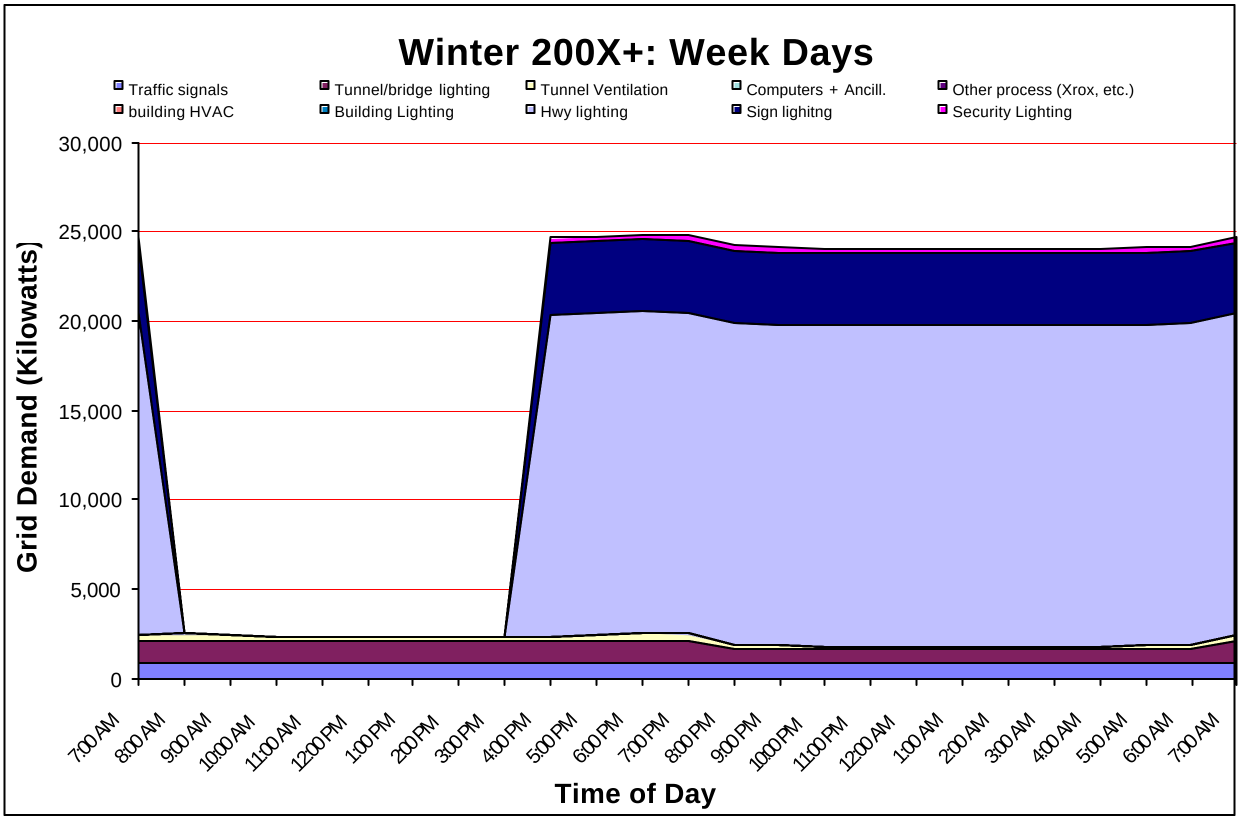
Winter 200X+: Week Days
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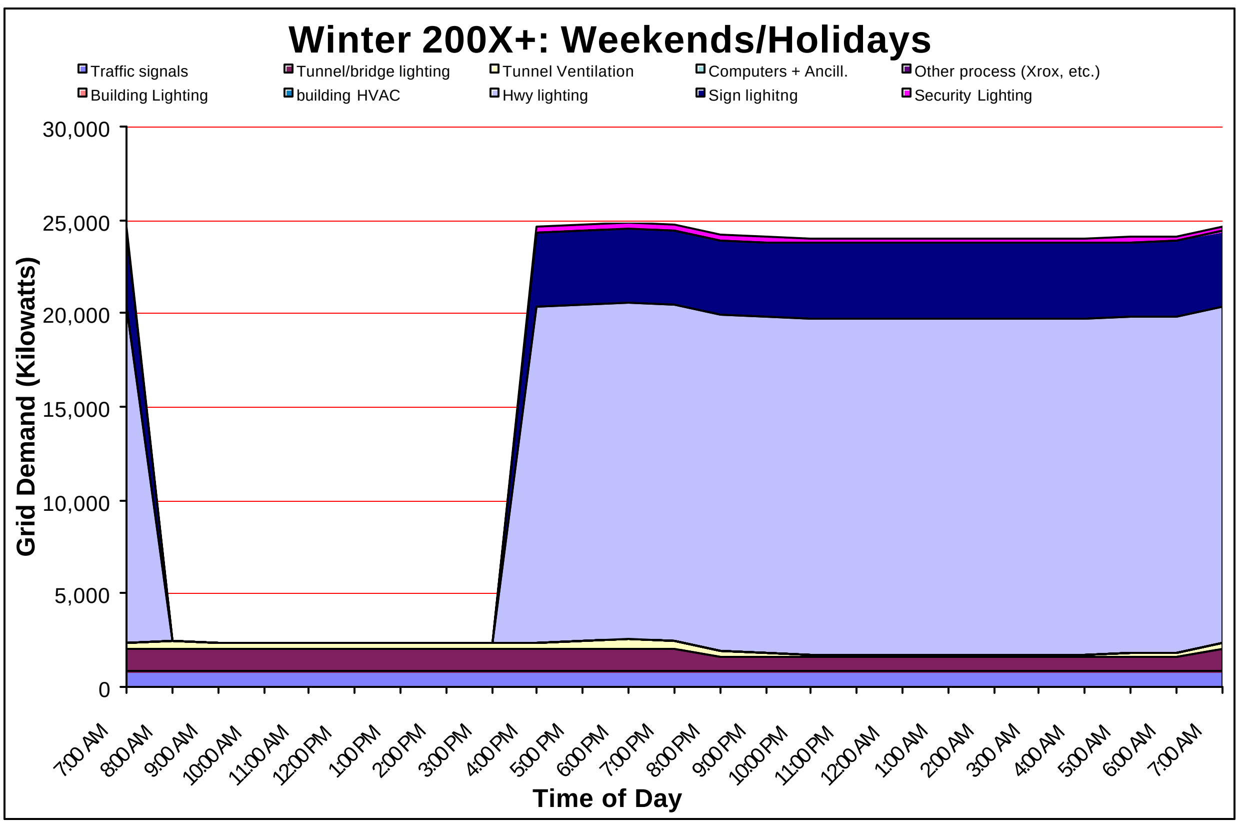
Time of Day


Winter 200X+: Weekends/Holidays
Traffic signals
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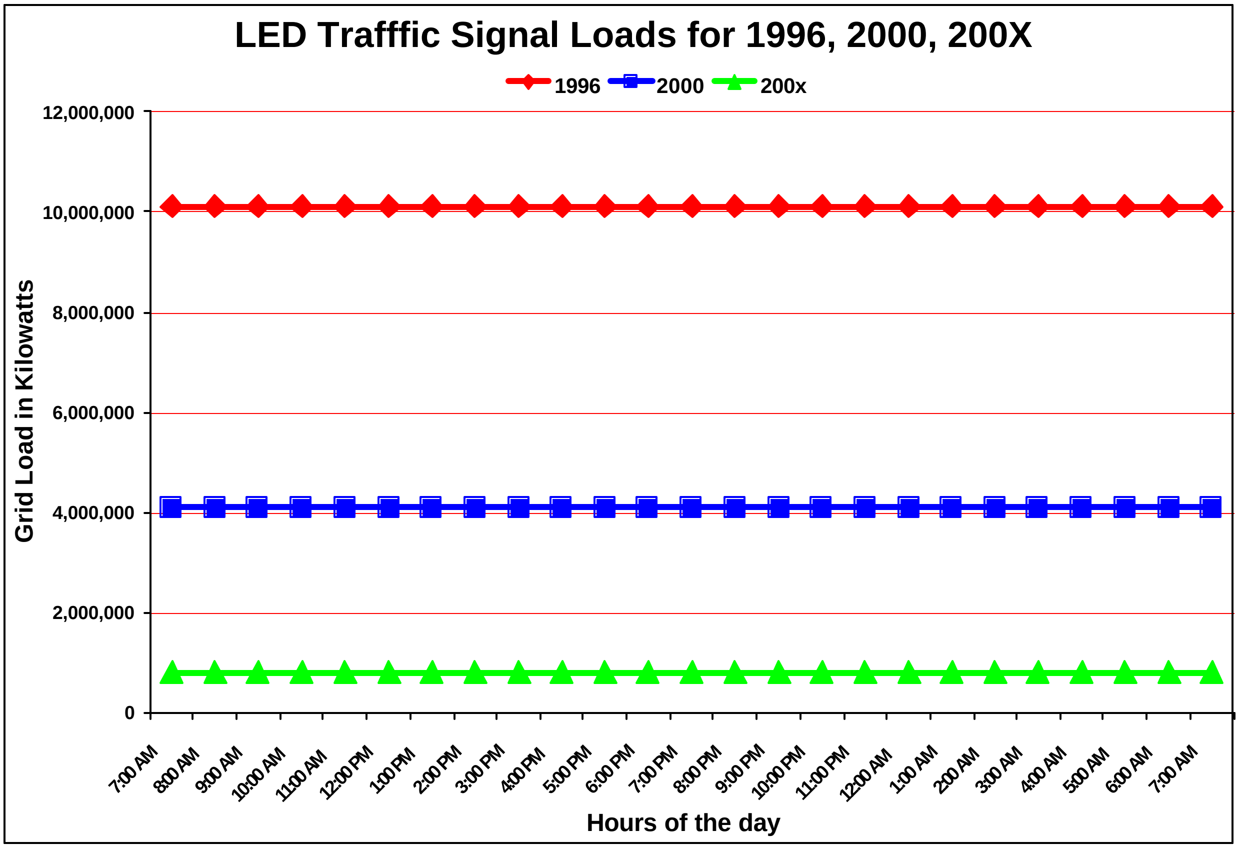
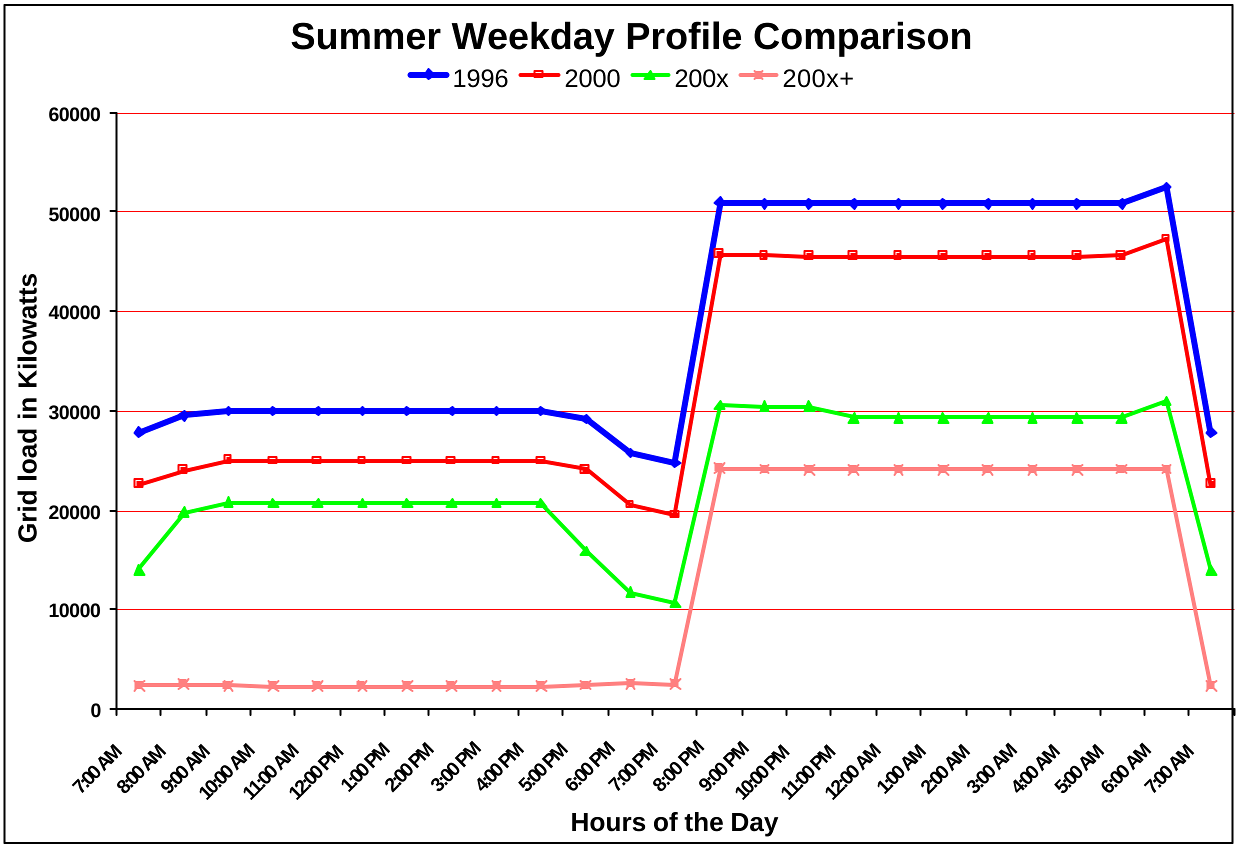
Let's compare and contrast some of the loads:

LED Signal Impact Comparisons from 1996 to 200X



Weekday Summer Load Comparisons
For 1996, 2000, 200X, 200X+



Selective Energy Charts
For
Large Facilities

Background:
The following series of charts and related data tables include district offices in Districts 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11. Sacramento based major facilities include 1120 N Street and the Div. of Equipment, METS Lab, and the Warehouse complexes. Leased facilities at Shields Ave in Fresno and Farmers' Market III in Sacramento are included in this section because the Department pays the utility costs at those facilities. (District 12's office is not included in this report because the District Office is located in a leased facility where the utility costs are included as a fixed fee per square foot of rental space. Very typical for leased space contracts.)

In 2004 and 2005 the new district office in D-7 will start occupancy and by early 2005 the older D-7 district office will be vacated and torn down. As of the Fall 2004 update for this project both sets of energy charts for District 7 will be included in this document. It will be interesting to see how energy consumption drops at one site and increases at the other. District DO's in 11 and 3 will be undergoing similar new construction and staff relocation over the next 6 years or so, and where possible will be tracked. (NOTE: Per DOF instructions to the Department and DGS, new facilities for Department will have their utility bills paid by DGS, who will in turn back charge the Department. Getting energy data from that new process may delay energy postings for those sites only.)

In 2004, District 10 HQ participated in an intra-governmental RFP sponsored by DGS and the California Power Authority (CPA). If the 200 KW photovoltaic (PV) project is implemented, a bulk of DO-10's power from PG&E will be replaced by solar-electric systems sited on the roof or two buildings. The PV power generation system will be owned and operated by a private sector partner who will supply the DO with power at a fixed discount off of PG&E's power tariffs. This effort is part of the Department's response to various Executive Orders and state law requiring "green" power systems to be sited on or at State government facilities. This project is expected to be completed and on-line in 2005.

Types of Charts:
For each facility, there will be three charts and data tables, unless otherwise noted:

- <u>Monthly Electricity Consumption:</u> This chart plots the total number of kilowatt-hours of electricity consumed by the facility in a given monthly utility billing cycle.
- <u>Monthly Electrical Grid Demand:</u> This chart plots the rate of electrical demand needed by the facility to supply peak electrical needs during any given monthly utility billing cycle. This peak demand figure is typically determined during the utility's period of peak customer usage. Peak demand normally occurs during a weekday afternoon on the hottest day of any given monthly utility billing cycle.
- <u>Monthly Natural Gas Consumption:</u> This chart plots the total number of therms of natural gas consumed by the facility in a given monthly utility billing cycle.

Patterns to look for:
There are three basic patterns to look for when examining the following energy charts:

- Seasonal swings: In most departmental facilities, electricity has its maximum usage during the "cooling season", and natural gas consumption is at its maximum usage during the "heating season." If the graph curve repeats itself from year to year, then the chart's curve should not vary in its basic shape. Since no year's weather is the same as any other year, the chart's patterns should not vary much. Internal heat loads in a facility may modify the impact of weather on the annual consumption pattern. However, if no detailed energy consumption study has been conducted on the facility, then the impact of internal loads, and conservation activities may be overshadowed by changes in seasonal weather conditions.

- Billing period swings: Some utilities do not always read the utility meter every 30 days. Based upon utility bill analysis, billing periods may vary from 26 to 37 days. Another reason to view monthly utility bills in proper perspective. In some rare cases (mostly natural gas meter reading) periods of 60 to 90 days between meter readings may occur, especially during summer months where low gas consumption occurs. Where these gaps occur, the choice is to either average the consumption over that period of time, or let the consumption spike occur. In the following charts, the averaging approach was used to sooth out patterns where applicable. It should be noted however, that when trying to determine the impact of conservation activities during periods where meter reading skips or the more normal plus or minus 6 day variation in billing periods, the analysis should try to normalize the data to average daily consumption or better yet define workday and non-workday consumption patterns for a facility. This can be done manually or automatically using a well-designed facility energy management system.

- Impact of conservation efforts: The impact of energy conservation activities within a facility may or may not show up in changes to the monthly consumption patterns. Typically, on a project-by-project basis, most energy conservation measures
- (**Example:** Unless the billing periods are normalized to a 30 day billing period, the 12% normal variance billing cycles could either hide or overstate the impact of energy conservation measures that reduce normal energy consumption in the facility by 8%. If you are comparing current consumption against past years rate of consumption. The same can be true if any given month's weather is X% worse or better than a similar month in past years. It has been a past practice by departmental energy staff to track the before and after energy consumption patterns of all energy consuming devices/systems that are to be impacted by an energy conservation measure (ECM). The resulting savings for those implemented ECMs are then tracked over the expected life of the equipment/system. Tracking energy savings by project eliminates the need to track utility data at the facility in order to assure savings are occurring.)

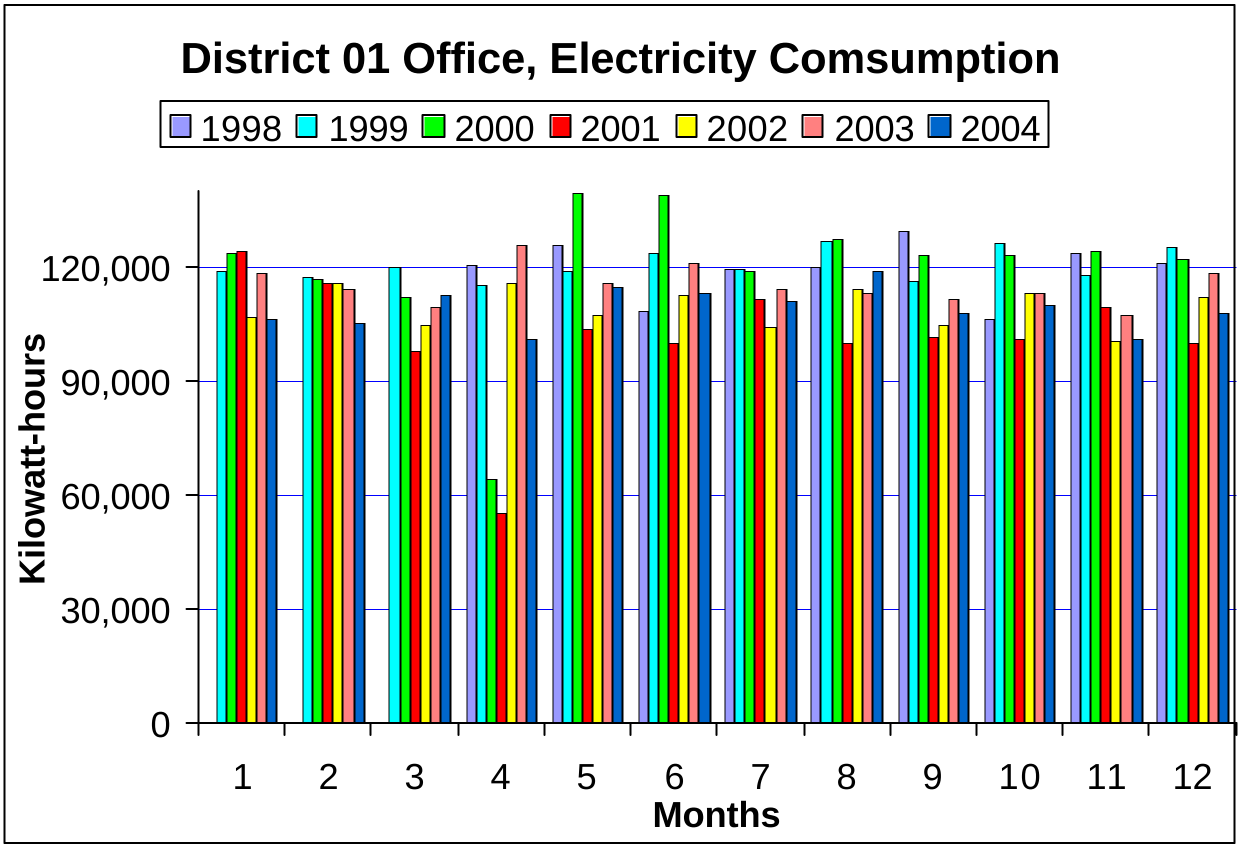
Data sources for the various charts:

Data collected in the following tables and resulting charts come from utility data, for the most part supplied directly from the servicing utility for each facility. In some cases, natural gas data has been supplied from the Department's "PUBS" database maintained and operated by the Utilities Accounts Payable unit within the Department's Division of Accounting. Electrical data that includes electrical demand charges (in kilowatts) came directly from utility data sources because PUBS database does not extract and store electrical demand data from processed utility bills. PUBS is a good source for account payment tracking and basic utility consumption data (i.e., kilowatt-hours, therms of natural gas, expended funds.)

On page 83, the reader will find charting for statewide totals for the 17 district and HQ facilities documented in pages 49 through 80. Since some of the facilities do not have historical data for 1998 and 1999, the charting starts in Calendar Year 2000. Interested parties can compare individual facility profiles with the average profiles for the 17 facilities.

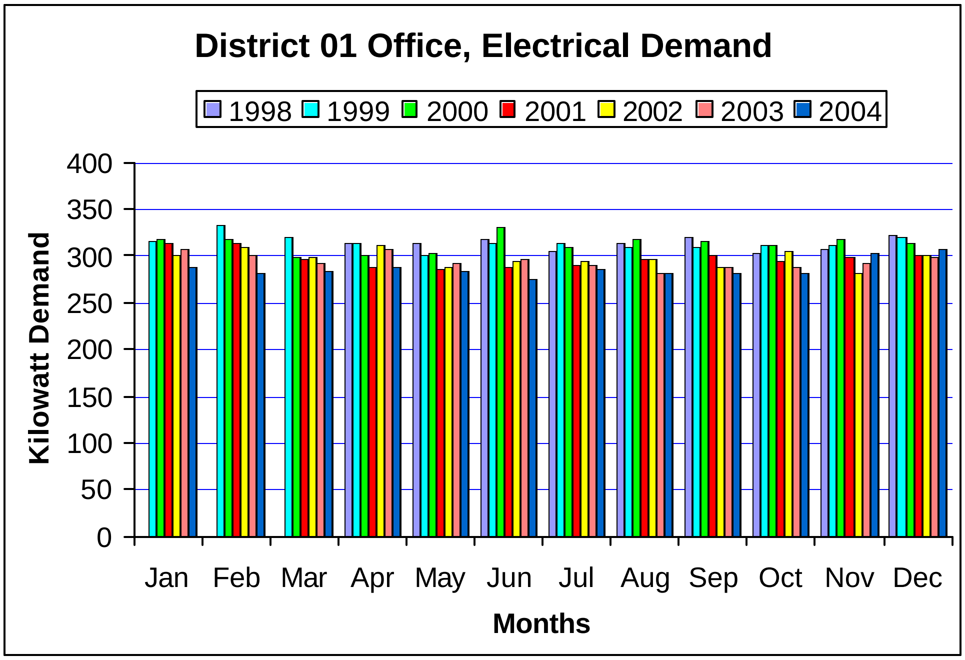
Tends to look for: As you look at the monthly data, it is often hard to figure out what is really going on. Is it good or bad that last month's consumption or demand is higher than previous years or the month before? As discussed above, there are numerous reasons why there are variations. However, if your demand is down and your consumption is up, then you can assume that systems are operating for longer periods of time. It could be more days in the billing period, weather causing the HVAC systems to operate for longer periods, it could be staff is or is not turning off equipment at the end of the business day, and it could also mean staff is working overtime to catch up on work because of staff shortages. Lots of reasons and with no system sub-metering and tracking resources, we cannot tell what is really going on other than general trends. Site managers and O&M staffs should have a feel as to how the facility is operating and where savings potentials still exist (short of capital investment in the facility's energy systems.) If the building loads go up and consumption goes down, that would tend to mean that the hours of operation are being controlled. It is always a good sign if both energy demand and consumption goes down, however, remember that what goes down will go up at some point. As you can see, the more years of data we can plot, the better we can see the facilities potential for consumption.

District 01 District Office:
1656 Union St.
Eureka, CA 95501



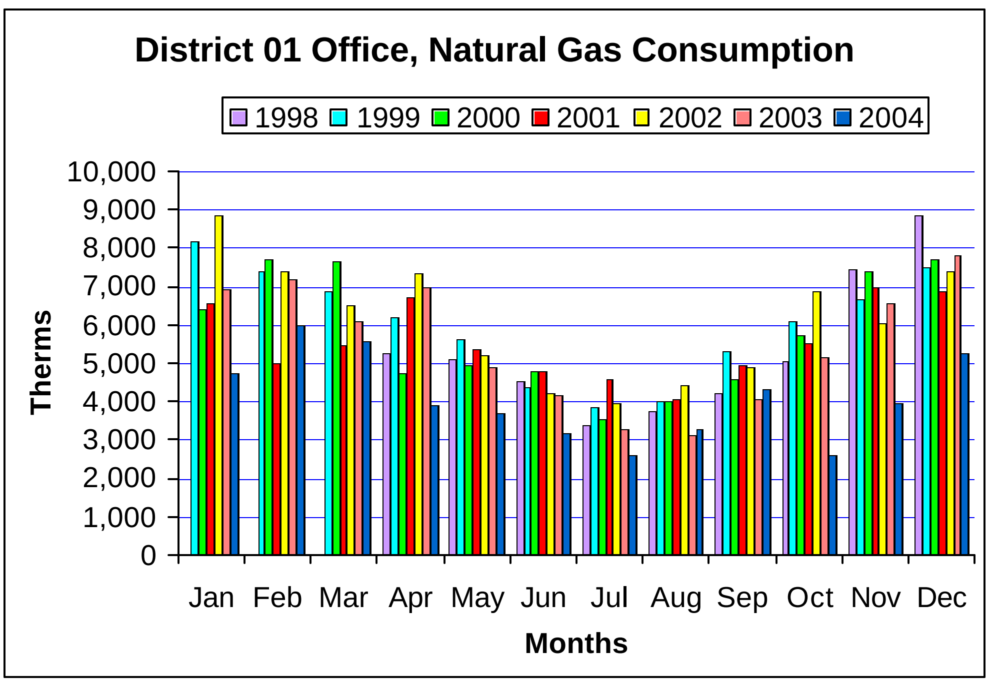
Monthly Kilowat-Hour Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998				120,254	125,726	108,370	119,195	119,693	129,263	106,000	123,627	120,852
1999	118,770	117,365	119,965	115,208	118,947	123,748	119,334	126,702	115,978	126,442	117,761	125,411
2000	123,691	116,742	112,225	64,050	139,153	138,743	118,973	127,306	123,337	123,006	123,890	122,098
2001	124,206	115,568	97,787	55,282	103,706	100,025	111,390	100,129	101,726	100,963	109,457	99,898
2002	106,824	115,697	104,449	115,916	107,533	112,657	103,973	113,859	104,442	113,052	100,277	111,837
2003	118,365	114,281	109,569	125,600	115,950	120,775	114,029	113,168	111,726	112,889	107,100	118,113
2004	106,254	105,156	112,606	100,802	114,793	112,909	110,994	118,961	107,946	110,008	100,748	107,578



Monthly Electric Demand in Kilowatts

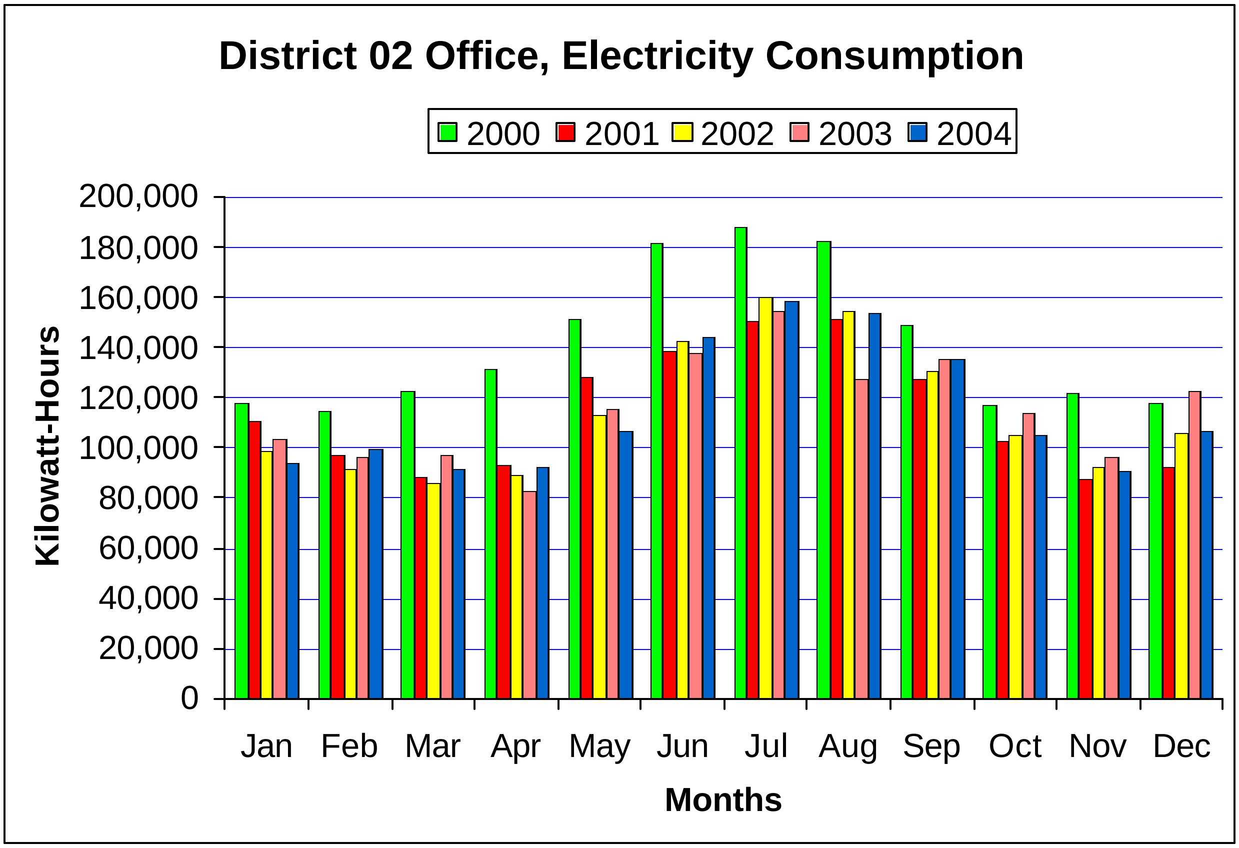
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	0	0	0	315	314	319	306	314	320	304	308	322
1999	316	334	321	313	301	314	314	309	310	311	312	321
2000	318	318	298	302	304	332	310	318	316	312	319	313
2001	313	314	297	289	286	289	290	296	301	295	299	302
2002	302	309	298	311	289	295	295	297	289	305	281	302
2003	307	302	293	308	293	296	290	281	288	288	293	298
2004	289	282	284	289	284	276	285	282	282	282	304	308



Monthly Natural Gas Consumption

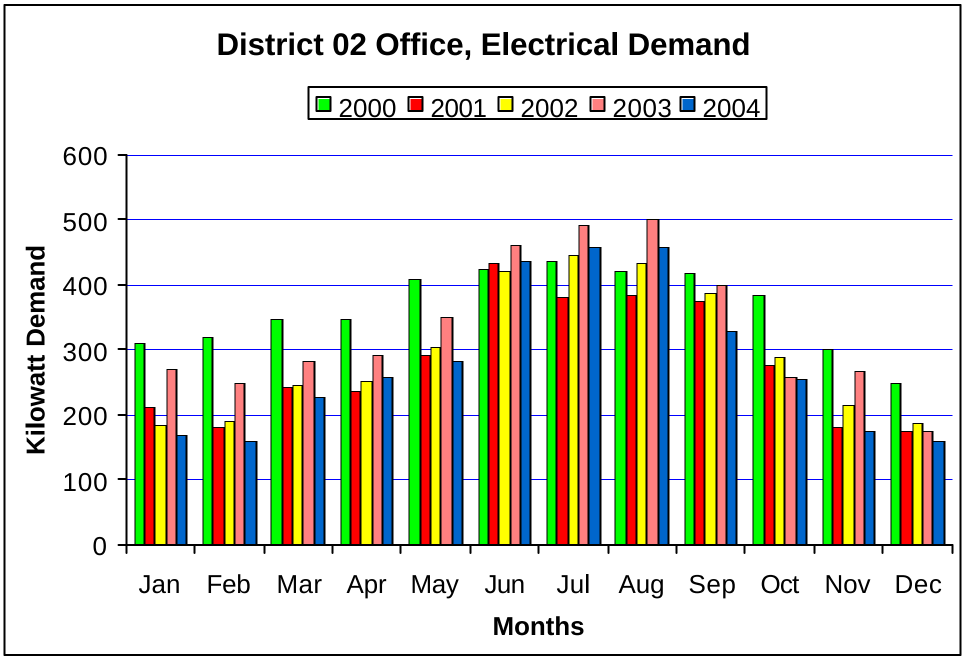
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998				5,249	5,125	4,519	3,407	3,754	4,205	5,071	7,422	8,836
1999	8,169	7,376	6,864	6,189	5,639	4,393	3,838	4,022	5,300	6,116	6,666	7,506
2000	6,410	7,720	7,658	4,733	4,974	4,811	3,551	4,018	4,587	5,741	7,420	7,700
2001	6,578	5,017	5,494	6,732	5,343	4,797	4,585	4,085	4,924	5,544	6,958	6,874
2002	8,841	7,388	6,533	7,356	5,182	4,207	3,954	4,430	4,883	6,875	6,062	7,390
2003	6,927	7,191	6,077	6,992	4,894	4,184	3,256	3,133	4,079	5,171	6,564	7,805
2004	4,760	6,004	5,599	3,891	3,724	3,157	2,616	3,291	4,305	2,624	3,955	5,277

District 02 District Office:
1657 Riverside Drive,
Redding, CA



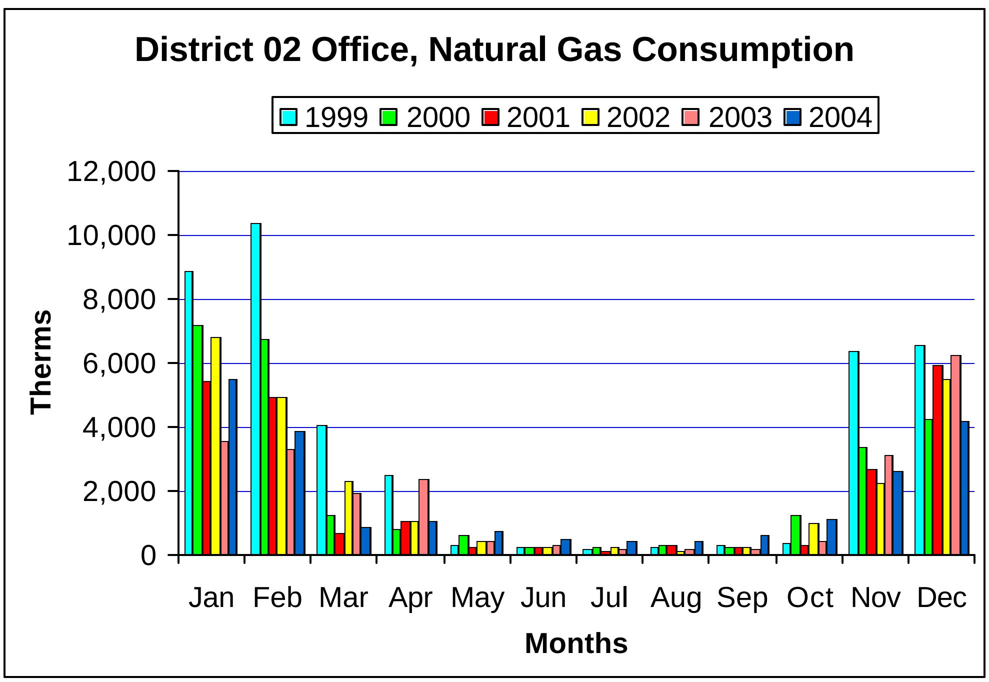
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	118,000	115,000	122,240	131,520	151,520	181,480	188,040	182,200	149,040	117,280	122,200	117,840
2001	110,520	97,080	88,560	93,320	128,360	138,760	150,160	151,563	127,160	102,320	87,280	92,480
2002	98,840	91,280	85,880	89,160	113,280	142,200	160,000	154,720	130,760	104,920	92,480	105,520
2003	103,600	96,280	96,800	83,040	115,680	137,840	154,760	127,040	134,920	113,520	96,520	122,360
2004	94,000	99,160	91,760	92,320	106,520	144,360	158,400	153,400	135,320	104,920	90,440	106,240



Monthly Electrical Demand

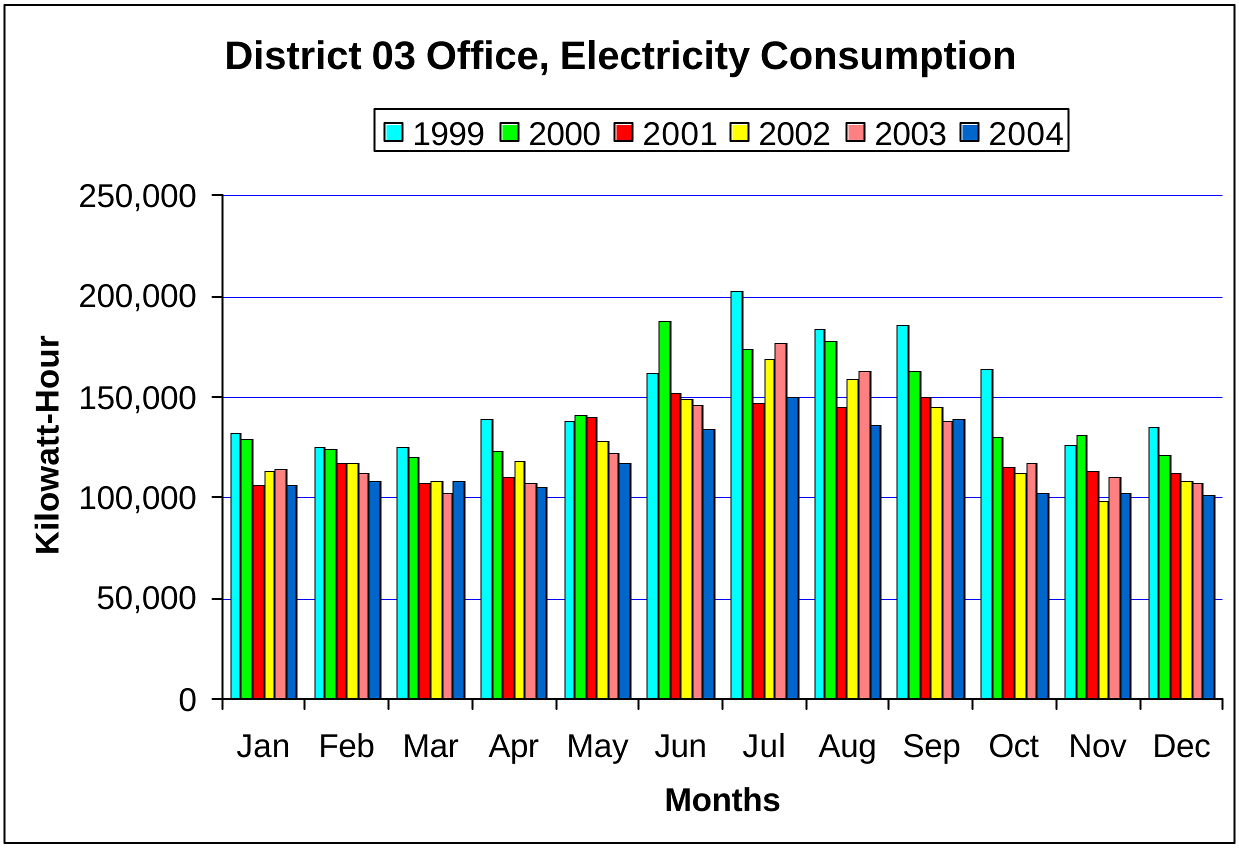
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	310	320	348	348	408	425	435	420	417	385	301	248
2001	212	180	241	237	291	433	379	385	374	275	180	175
2002	185	190	246	250	305	420	444	432	388	287	215	186
2003	271	249	281	290	350	459	490	499	398	258	267	175
2004	167	158	227	256	282	436	457	457	327	254	176	158



Monthly Natural Gas Consumption

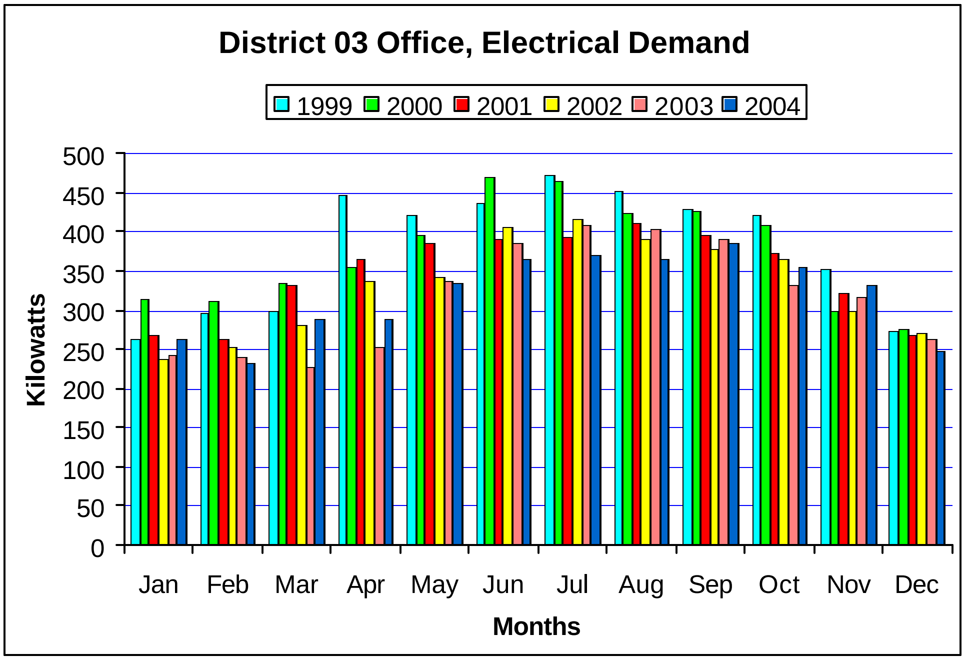
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	8,875	10,372	4,050	2,516	304	226	188	232	296	388	6,387	6,562
2000	7,184	6,749	1,224	845	622	273	256	332	251	1,242	3,357	4,275
2001	5,457	4,963	709	1,067	246	254	115	334	244	298	2,690	5,948
2002	6,791	4,962	2,327	1,053	454	261	254	114	243	1,005	2,250	5,521
2003	3,545	3,291	1,931	2,357	422	285	197	194	197	456	3,107	6,235
2004	5,524	3,902	863	1,075	724	492	441	454	620	1,108	2,600	4,166

District 03 District Office:
703 B Street,
Marysville, CA



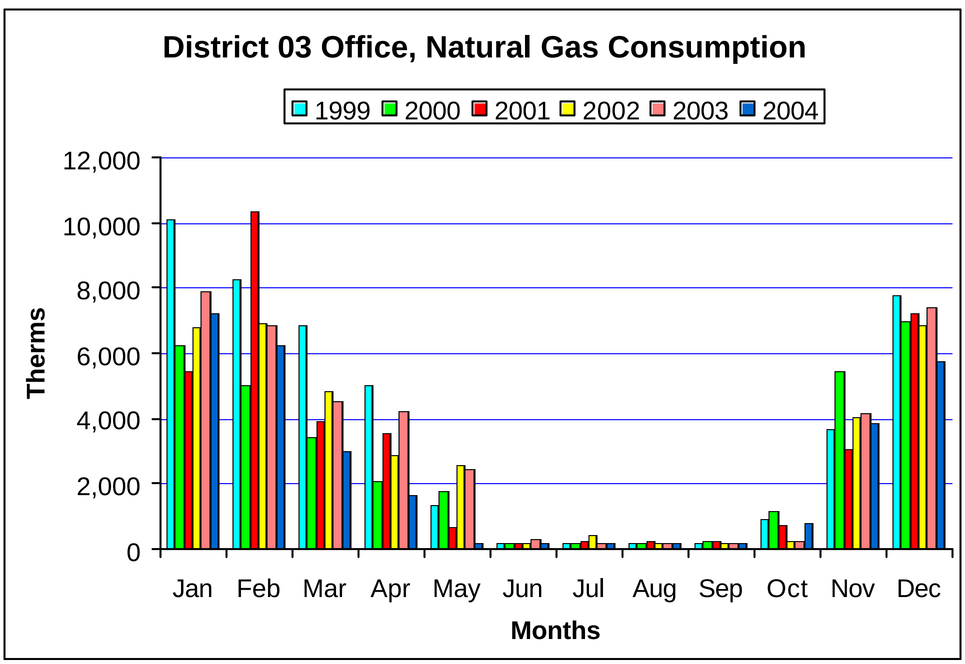
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	132,383	125,383	125,548	138,612	138,560	161,578	202,610	183,458	185,826	163,538	126,003	135,064
2000	128,868	124,243	120,155	122,984	140,994	187,397	173,800	178,307	162,699	130,088	131,203	121,560
2001	106,156	116,670	106,768	109,972	140,343	152,261	147,325	145,496	149,568	115,597	112,930	112,527
2002	112,780	117,547	108,142	118,489	127,964	148,990	168,678	159,075	145,370	111,869	98,053	108,787
2003	114,387	112,412	102,374	107,081	122,366	145,950	176,292	162,586	138,472	117,736	110,708	107,220
2004	105,844	107,753	107,849	105,361	117,603	134,100	150,319	135,838	138,574	102,393	101,904	101,540



Monthly Electrical Demand

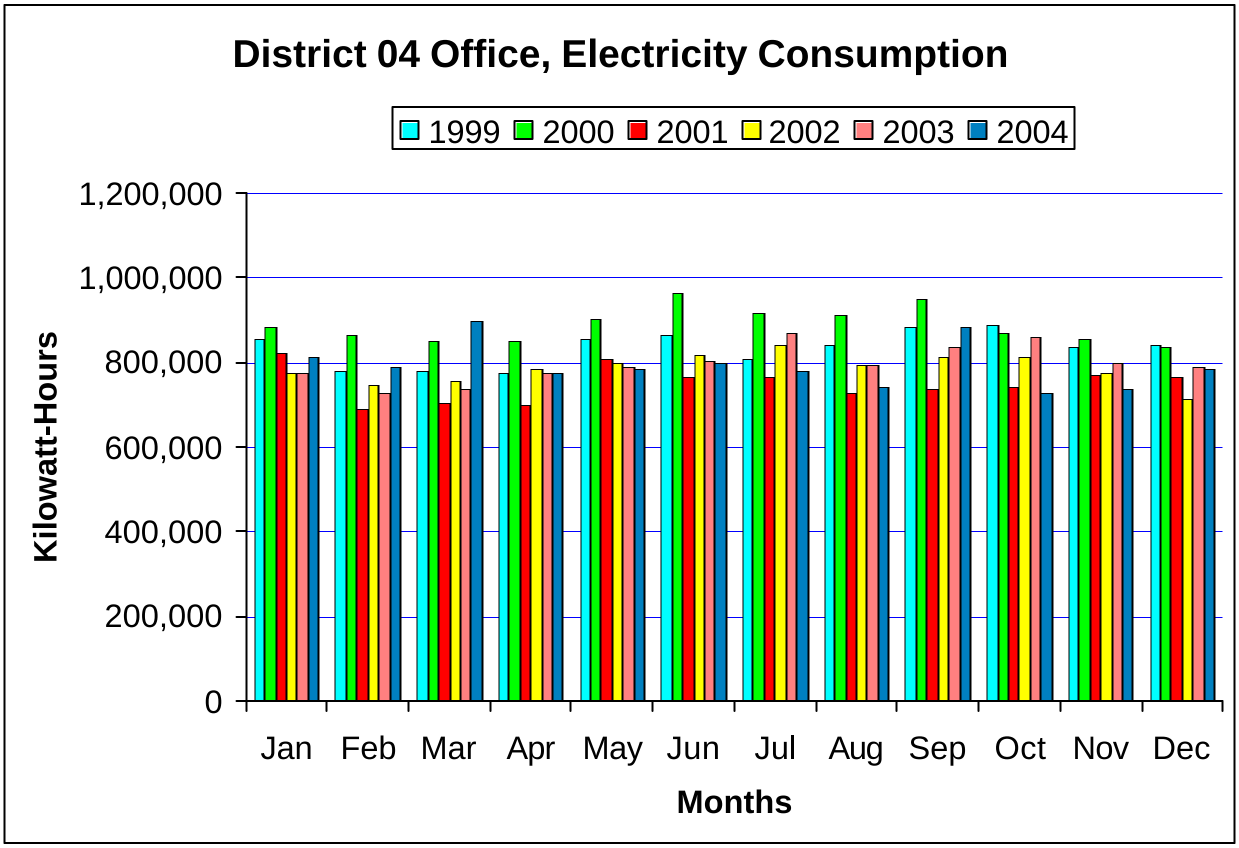
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	264	296	298	448	421	437	472	453	430	421	353	274
2000	315	312	334	354	395	471	464	424	426	409	299	276
2001	269	263	331	364	385	391	393	411	395	374	322	269
2002	237	252	280	337	341	405	417	392	377	365	300	270
2003	242	240	228	252	336	385	409	403	391	331	316	264
2004	264	233	288	289	335	364	371	366	385	355	332	247



Monthly Natural Gas Consumption

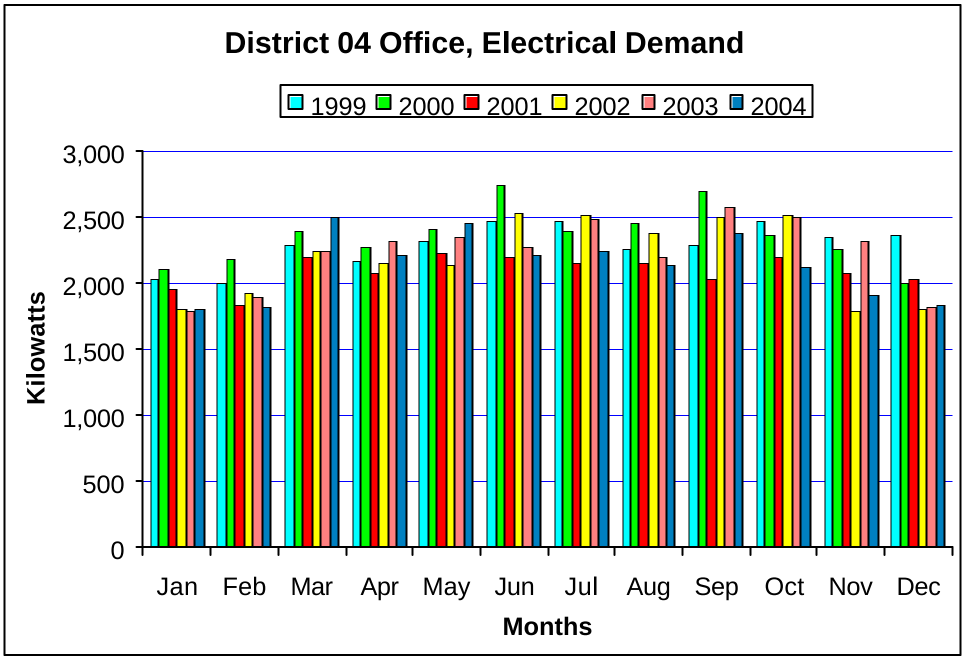
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	10,105	8,293	6,869	5,050	1,340	202	199	193	193	908	3,650	7,794
2000	6,223	5,009	3,402	2,072	1,772	192	190	191	227	1,171	5,449	7,017
2001	5,433	10,344	3,890	3,554	644	208	213	226	240	745	3,059	7,259
2002	6,804	6,916	4,828	2,867	2,585	186	417	191	191	221	4,061	6,849
2003	7,900	6,863	4,517	4,228	2,467	276	171	187	176	231	4,144	7,387
2004	7,254	6,271	2,989	1,645	189	177	188	170	172	809	3,841	5,781

District 04 District Office:
111 Grand Ave.
Oakland, CA



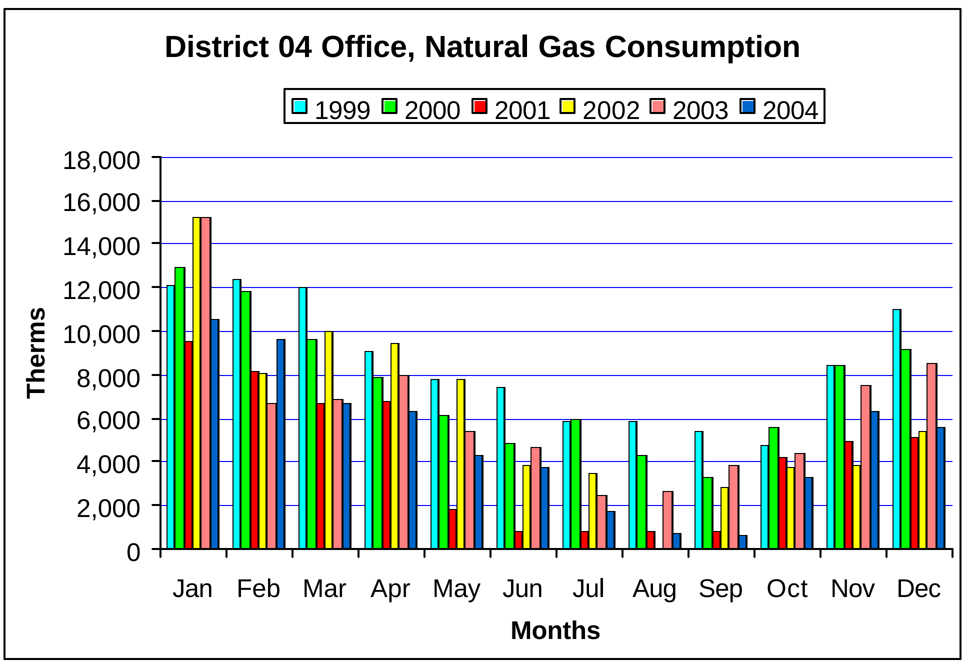
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	853,214	777,260	777,685	775,852	855,144	863,595	808,304	838,436	883,650	886,080	834,640	839,325
2000	884,678	862,585	850,932	851,097	900,598	961,993	914,666	912,915	949,827	869,346	853,705	834,623
2001	821,750	691,935	704,438	700,606	809,690	765,197	762,705	729,515	735,813	741,786	770,896	767,072
2002	773,249	745,145	753,280	783,973	798,398	816,651	840,464	794,321	812,758	812,692	772,719	712,233
2003	772,824	728,169	736,169	774,356	786,619	803,562	871,076	794,015	836,594	858,537	799,057	788,446
2004	814,468	787,523	895,462	772,987	782,400	799,090	778,468	742,570	883,258	727,270	735,546	785,726



Monthly Electrical Demand

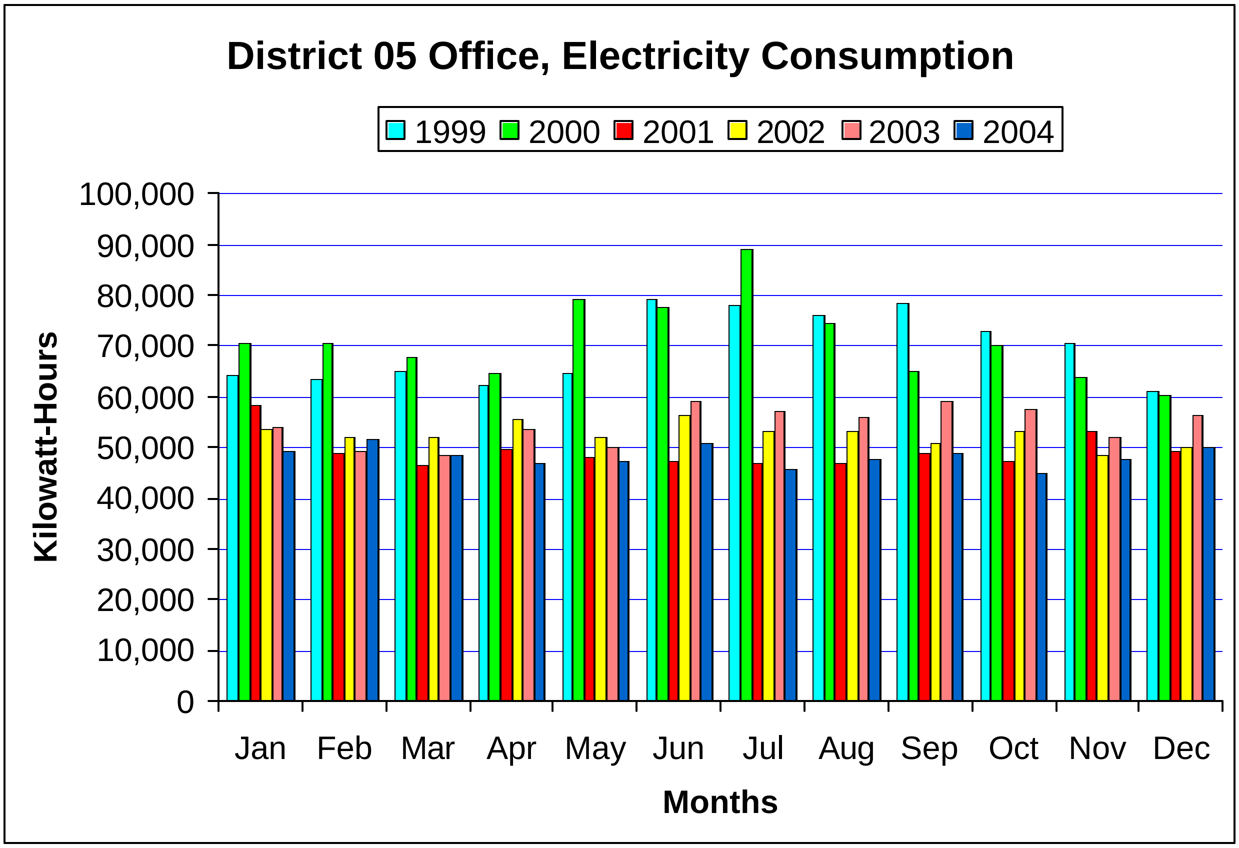
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	2,031	2,007	2,296	2,174	2,317	2,472	2,470	2,262	2,294	2,467	2,346	2,367
2000	2,106	2,176	2,387	2,277	2,414	2,745	2,395	2,461	2,698	2,362	2,258	2,004
2001	1,956	1,838	2,204	2,070	2,220	2,198	2,146	2,151	2,023	2,190	2,080	2,030
2002	1,798	1,919	2,244	2,145	2,138	2,527	2,512	2,376	2,493	2,518	1,780	1,800
2003	1,780	1,886	2,243	2,314	2,354	2,266	2,481	2,198	2,575	2,495	2,321	1,813
2004	1,801	1,817	2,494	2,210	2,453	2,211	2,237	2,130	2,373	2,118	1,909	1,835



Monthly Natural Gas Consumption

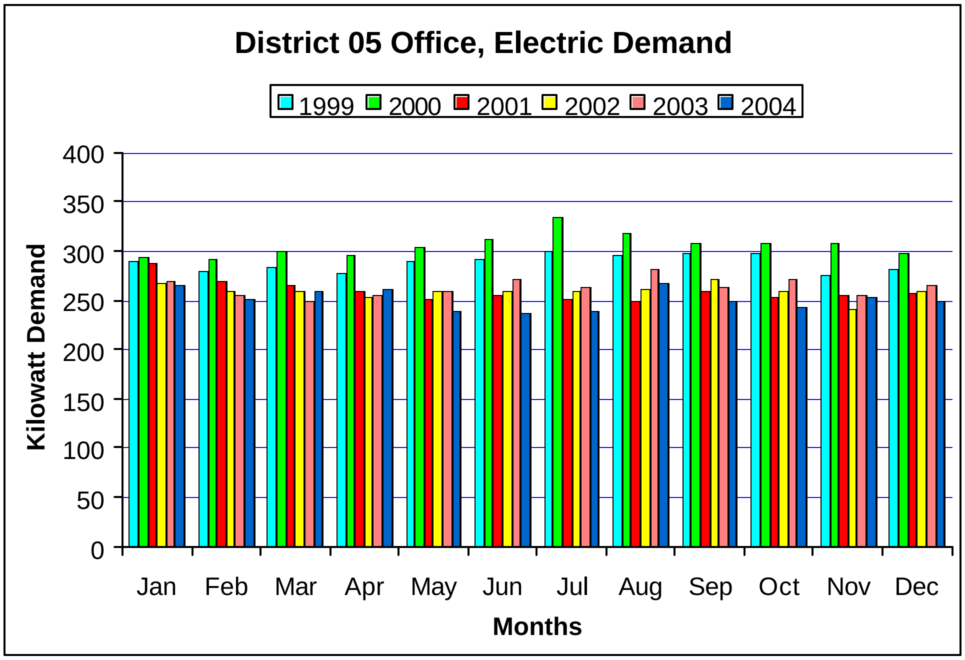
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	12,075	12,381	12,012	9,103	7,846	7,395	5,904	5,882	5,394	4,747	8,421	10,985
2000	12,919	11,798	9,622	7,854	6,125	4,878	6,002	4,330	3,317	5,629	8,481	9,138
2001	9,567	8,200	6,709	6,821	1,880	829	782	785	807	4,229	4,956	5,115
2002	15,253	8,086	10,037	9,409	7,795	3,887	3,533	0	2,824	3,770	3,866	5,450
2003	15,251	6,696	6,863	7,992	5,430	4,724	2,525	2,620	3,872	4,425	7,489	8,531
2004	10,575	9,673	6,709	6,345	4,348	3,793	1,722	694	627	3,289	6,339	5,585

District 05 District Office:
50 Higuera Street
San Luis Obispo, CA



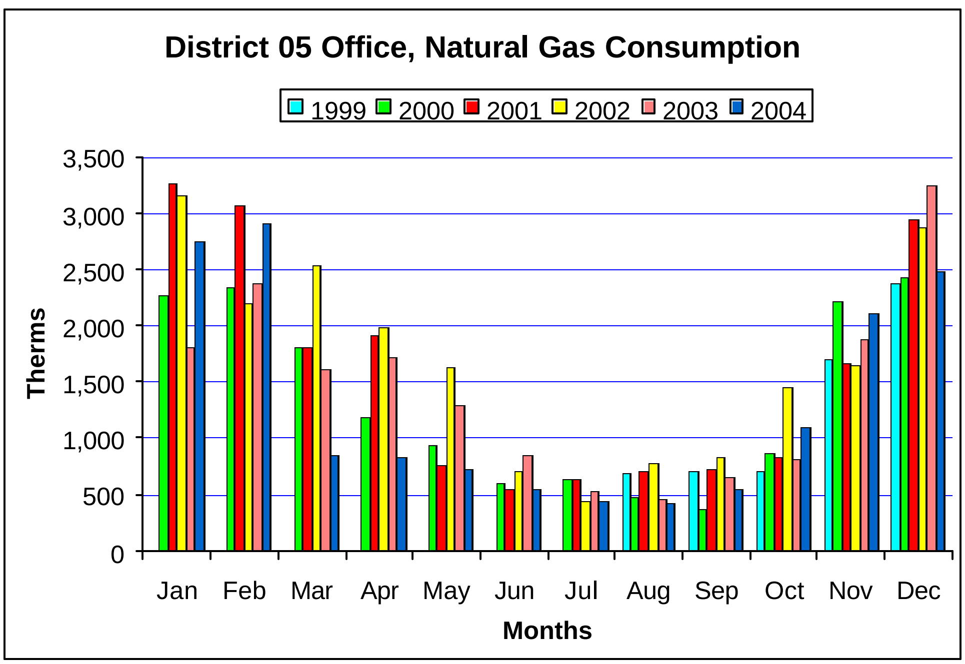
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	64,320	63,600	65,040	62,480	64,880	79,120	78,000	75,920	78,320	72,960	70,400	60,960
2000	70,720	70,400	68,000	64,880	79,120	77,600	88,960	74,640	65,040	70,160	64,080	60,240
2001	58,480	48,800	46,560	49,760	48,240	47,520	46,720	46,800	48,880	47,440	53,120	49,280
2002	53,600	52,160	52,160	55,600	52,000	56,320	53,040	53,129	50,880	53,280	48,320	50,240
2003	54,160	49,360	48,400	53,520	50,160	59,280	57,360	56,000	59,120	57,760	52,160	56,560
2004	49,440	51,760	48,480	47,040	47,280	51,040	45,920	47,920	49,040	44,800	47,840	50,160



Monthly Electrical Demand

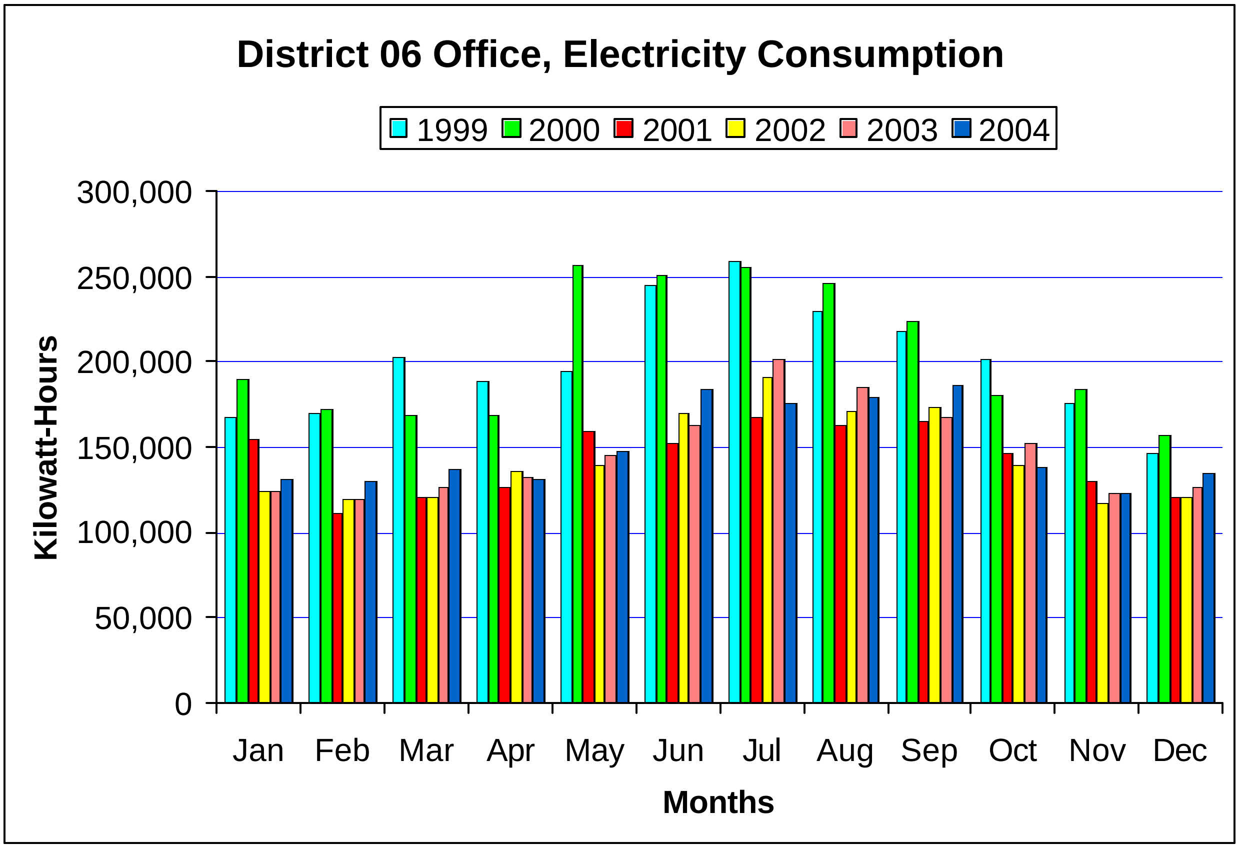
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	290	280	283	278	289	292	300	296	298	297	275	281
2000	294	292	299	295	304	311	334	318	307	307	307	297
2001	287	270	266	258	251	256	251	250	260	253	255	257
2002	267	260	260	253	259	260	260	262	272	258	240	260
2003	270	256	249	256	259	271	263	281	263	271	256	265
2004	265	251	259	262	238	236	239	268	248	243	253	248



Monthly Natural Gas Consumption

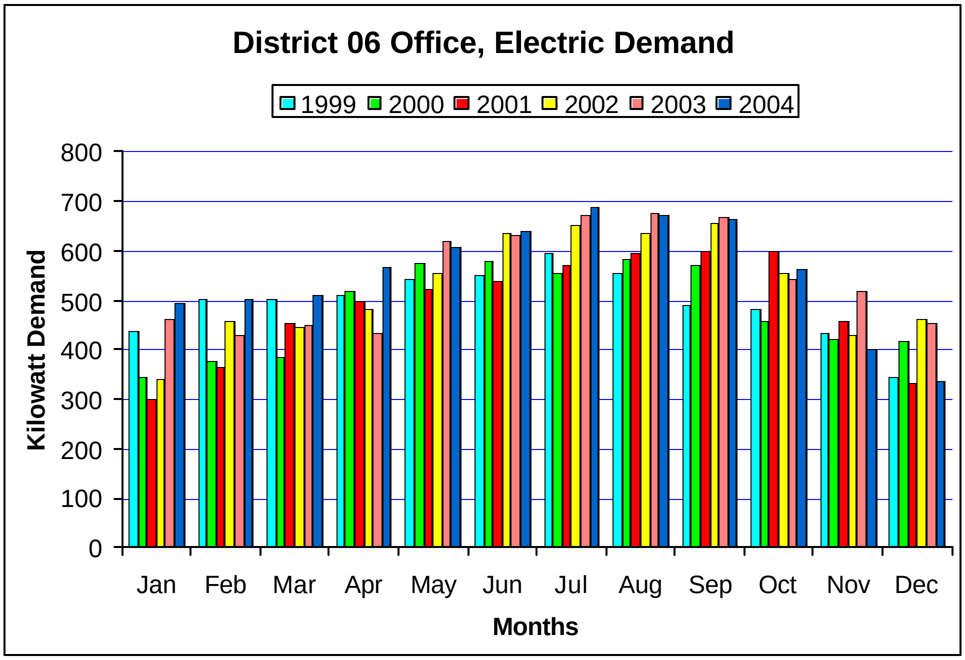
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999								685	702	698	1,699	2,380
2000	2,258	2,343	1,810	1,183	942	603	625	482	371	872	2,222	2,434
2001	3,254	3,070	1,806	1,912	761	547	642	698	715	833	1,670	2,940
2002	3,148	2,199	2,535	1,975	1,621	712	432	775	829	1,450	1,642	2,864
2003	1,809	2,374	1,611	1,723	1,294	842	523	460	649	809	1,872	3,238
2004	2,751	2,907	849	838	717	545	437	424	545	1,100	2,116	2,472

District 06 District Office:
1352 West Olive Ave
Fresno, CA



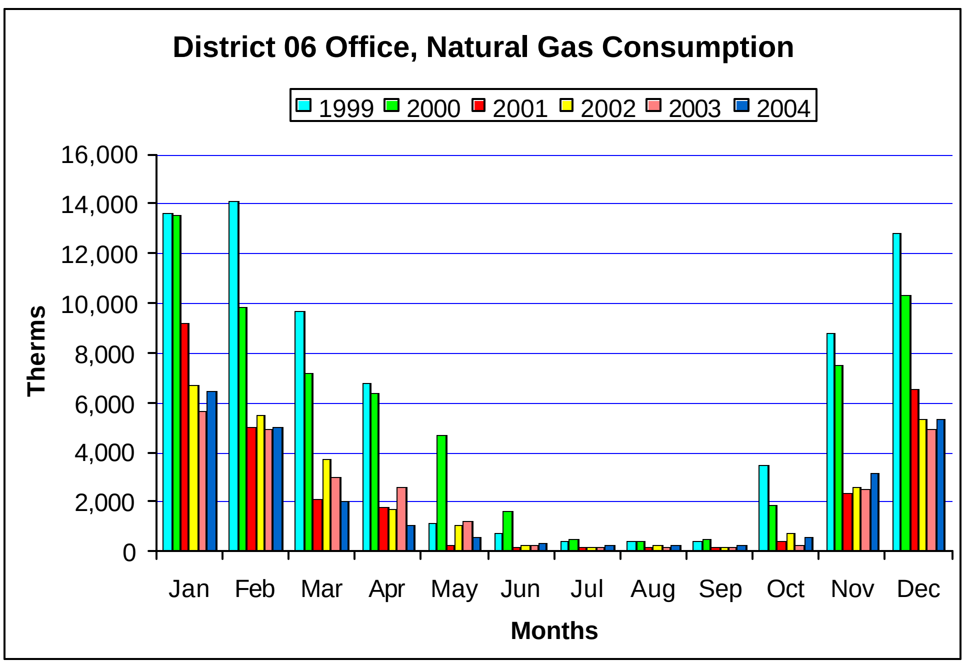
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	168,000	169,760	203,200	188,800	194,000	245,120	259,040	229,280	218,480	201,920	176,160	145,920
2000	189,680	172,480	168,080	168,800	256,880	250,880	255,760	245,920	223,840	180,960	183,920	156,560
2001	154,320	111,200	120,240	125,920	158,800	152,320	167,680	163,280	165,040	145,920	129,680	120,240
2002	123,760	119,680	120,560	135,840	138,960	169,680	190,560	170,720	173,840	139,680	117,360	120,720
2003	123,560	118,741	125,920	132,480	145,280	163,360	202,160	185,040	167,520	152,000	122,960	125,920
2004	130,560	130,263	136,857	131,609	147,520	183,680	175,600	179,680	186,240	138,560	122,800	134,320



Monthly Electrical Demand

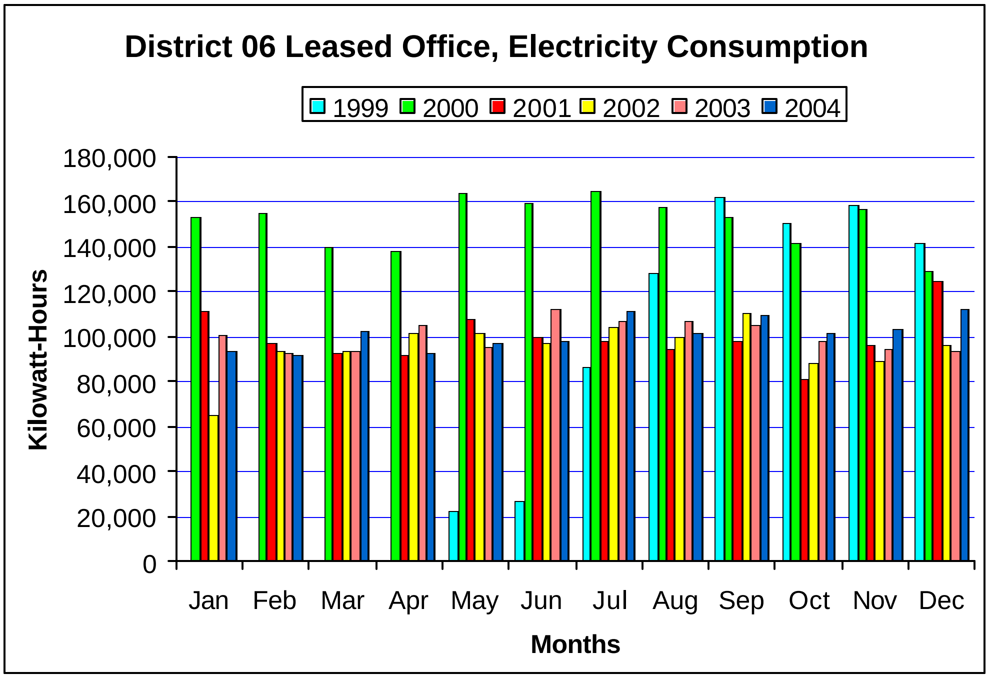
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	436	503	501	509	543	549	597	557	489	482	432	346
2000	346	379	387	518	576	579	557	584	571	458	421	419
2001	301	363	454	498	523	538	570	594	600	600	459	332
2002	342	458	445	483	555	634	653	635	656	557	430	462
2003	462	429	450	435	618	630	672	677	667	542	518	456
2004	494	501	509	568	608	638	690	672	664	562	400	336



Monthly Natural Gas Consumption

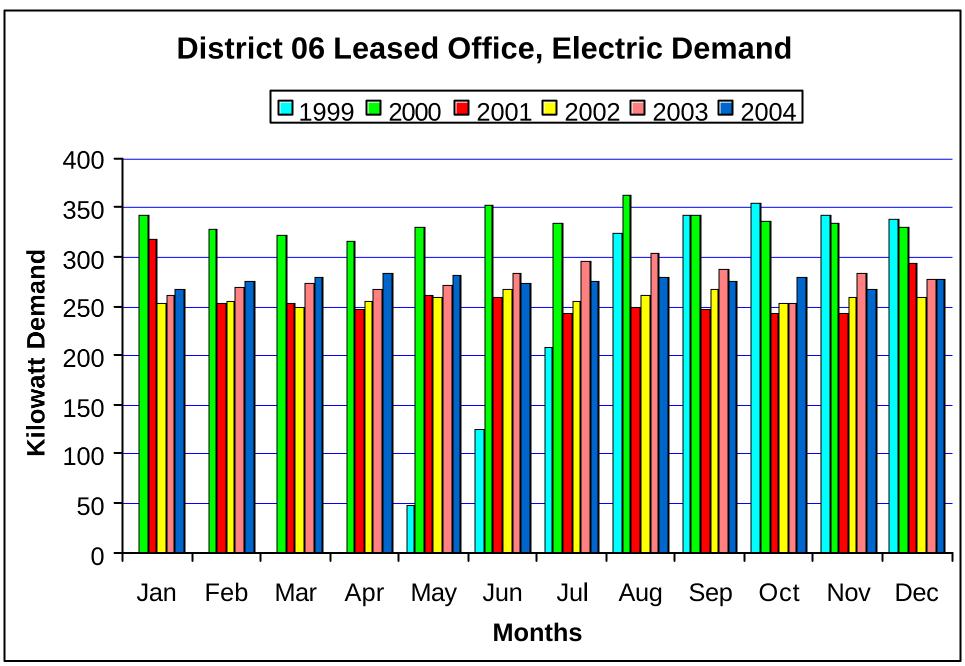
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	13,591	14,110	9,704	6,773	1,141	718	393	413	397	3,511	8,806	12,825
2000	13,577	9,824	7,173	6,374	4,671	1,644	519	388	502	1,867	7,490	10,342
2001	9,214	5,001	2,125	1,799	225	181	196	184	206	412	2,346	6,519
2002	6,739	5,492	3,727	1,731	1,022	234	206	224	191	751	2,622	5,347
2003	5,671	4,895	3,030	2,621	1,258	289	179	182	180	257	2,514	4,922
2004	6,484	5,025	2,019	1,060	552	304	263	277	298	620	3,118	5,300

District 06 District (Leased) Office at 2015 East Shields Ave.**:**



Monthly Electricity Consumption

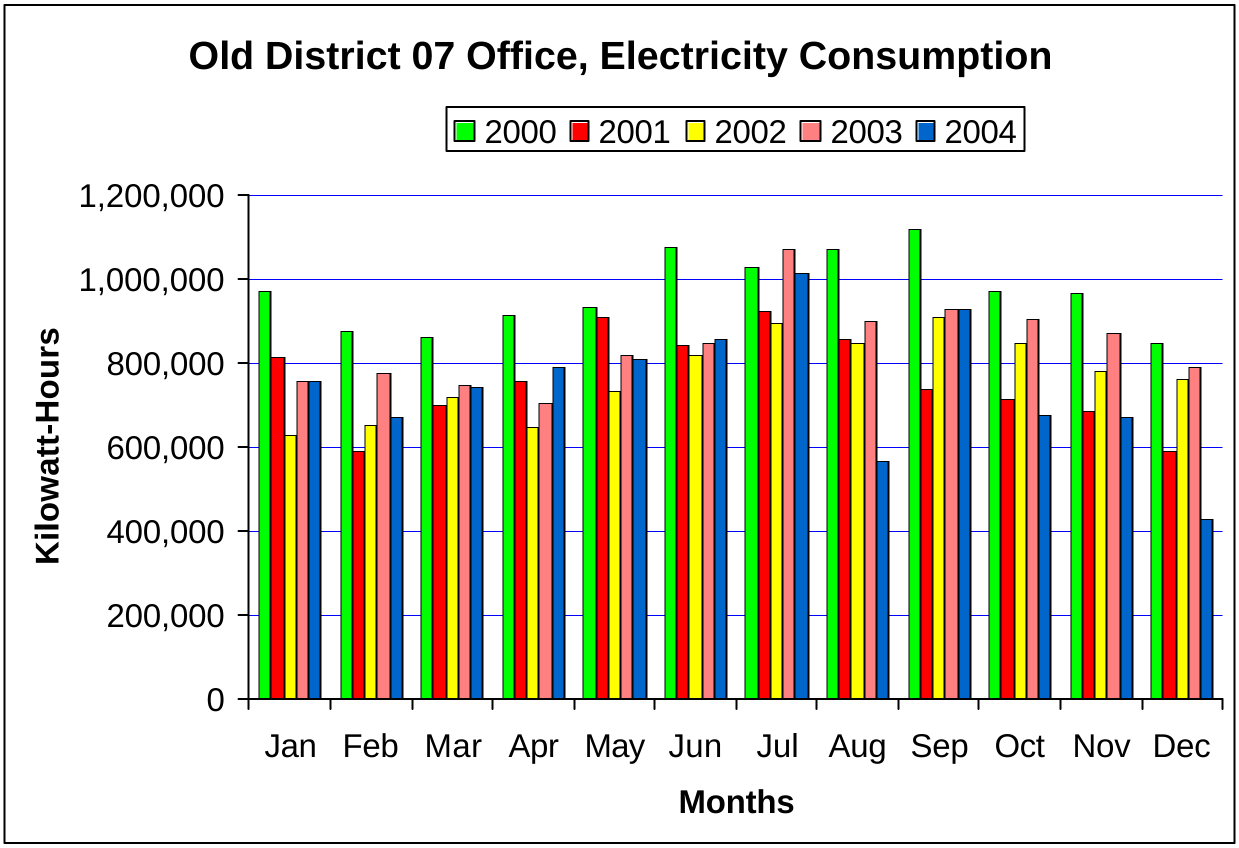
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
1999					22,720	26,440	86,160	128,520	162,320	150,480	158,000	141,320
2000	152,800	154,400	139,600	137,980	163,900	159,580	164,620	157,040	152,880	141,520	156,800	129,120
2001	111,040	96,720	92,560	91,880	107,560	99,320	98,240	94,480	97,440	81,200	96,080	124,800
2002	65,360	93,280	93,080	101,000	101,760	96,888	104,480	99,800	110,600	88,160	88,680	96,240
2003	100,920	92,240	93,760	104,880	95,520	112,200	107,160	106,800	105,360	97,640	94,640	92,960
2004	93,240	91,440	102,760	92,120	97,040	97,920	110,880	101,120	109,240	101,240	103,120	112,080



Monthy Electrical Demand

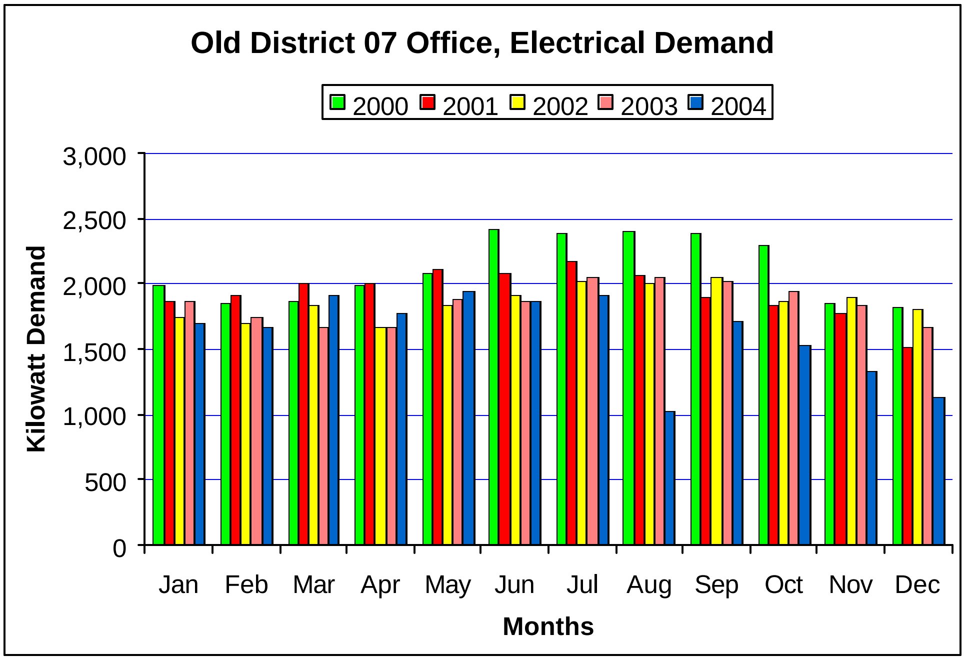
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999					48	125	208	324	342	354	342	339
2000	343	328	322	316	330	353	335	362	342	337	335	331
2001	318	253	254	246	261	259	242	248	247	242	242	293
2002	254	256	248	256	258	268	256	261	268	252	259	259
2003	261	269	274	267	271	284	296	304	288	252	284	278
2004	267	275	279	283	281	274	276	279	276	279	268	277

District 07 District Offices (Old and New):
120 South Spring Street
Los Angeles, CA



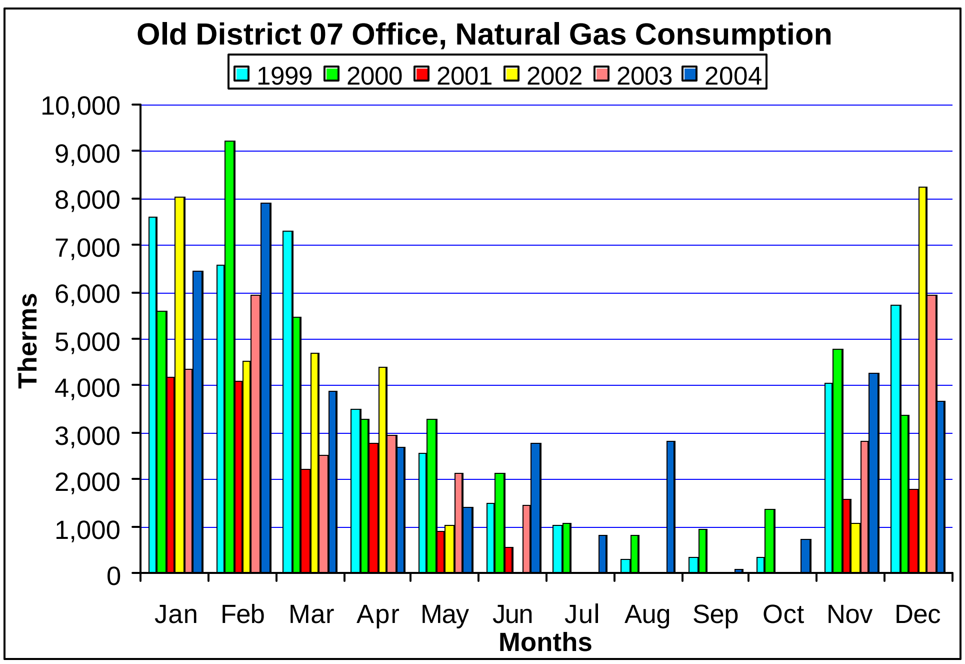
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	970,440	877,182	860,096	915,625	934,346	1,073,933	1,026,280	1,069,880	1,119,840	972,080	966,296	847,347
2001	814,660	590,353	699,234	758,084	908,789	841,040	924,480	856,520	738,240	713,811	687,320	590,091
2002	628,517	651,368	716,500	649,560	732,253	820,341	895,465	845,960	907,534	849,151	782,735	759,432
2003	758,640	777,280	747,040	706,440	821,080	847,862	1,072,593	899,720	929,204	904,200	869,960	790,172
2004	755,440	672,680	741,680	789,560	811,680	857,840	1,015,560	568,800	926,060	676,120	672,000	427,600



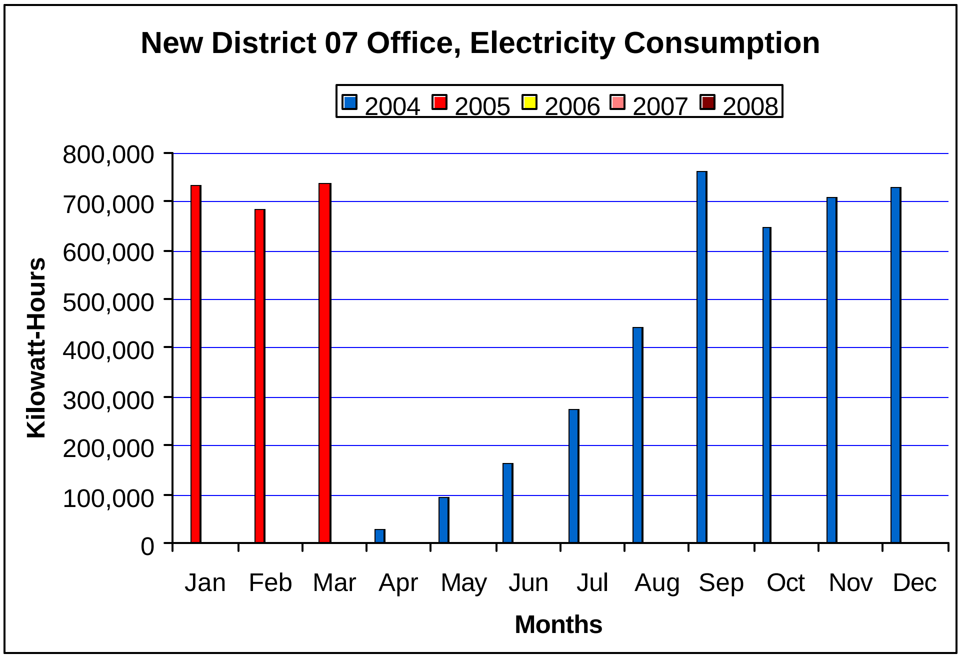
Monthly Electrical Demand

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	1,982	1,852	1,868	1,993	2,077	2,414	2,390	2,402	2,380	2,296	1,858	1,825
2001	1,860	1,915	1,999	2,006	2,104	2,074	2,172	2,058	1,895	1,833	1,774	1,508
2002	1,739	1,697	1,836	1,670	1,831	1,912	2,023	2,007	2,049	1,871	1,901	1,810
2003	1,863	1,749	1,669	1,673	1,877	1,873	2,044	2,056	2,012	1,937	1,836	1,667
2004	1,702	1,666	1,907	1,772	1,942	1,867	1,907	1,022	1,712	1,528	1,330	1,132



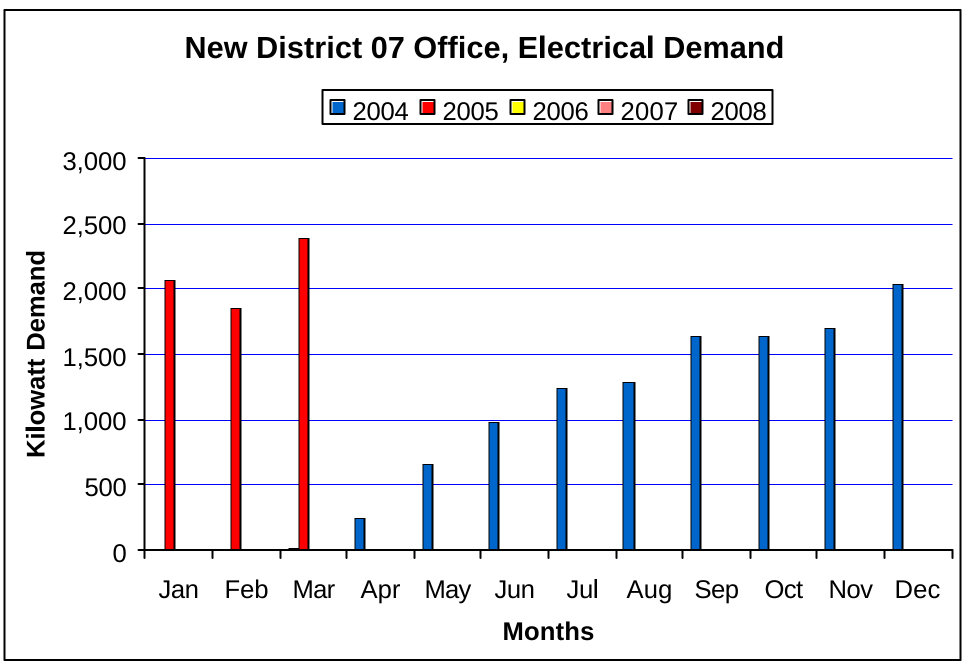
Monthly Natural Gas Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	7,587	6,573	7,283	3,489	2,579	1,513	1,061	308	343	360	4,055	5,722
2000	5,590	9,216	5,449	3,307	3,311	2,141	1,091	811	954	1,360	4,797	3,386
2001	4,200	4,085	2,247	2,767	895	562	40	0	0	2	1,596	1,792
2002	8,037	4,546	4,710	4,419	1,042	0	0	9	0	0	1,098	8,224
2003	4,358	5,921	2,523	2,964	2,164	1,475	0	0	0	0	2,847	5,954
2004	6,464	7,904	3,890	2,695	1,422	2,766	817	2,809	118	734	4,257	3,690



Monthly Electricity Consumption

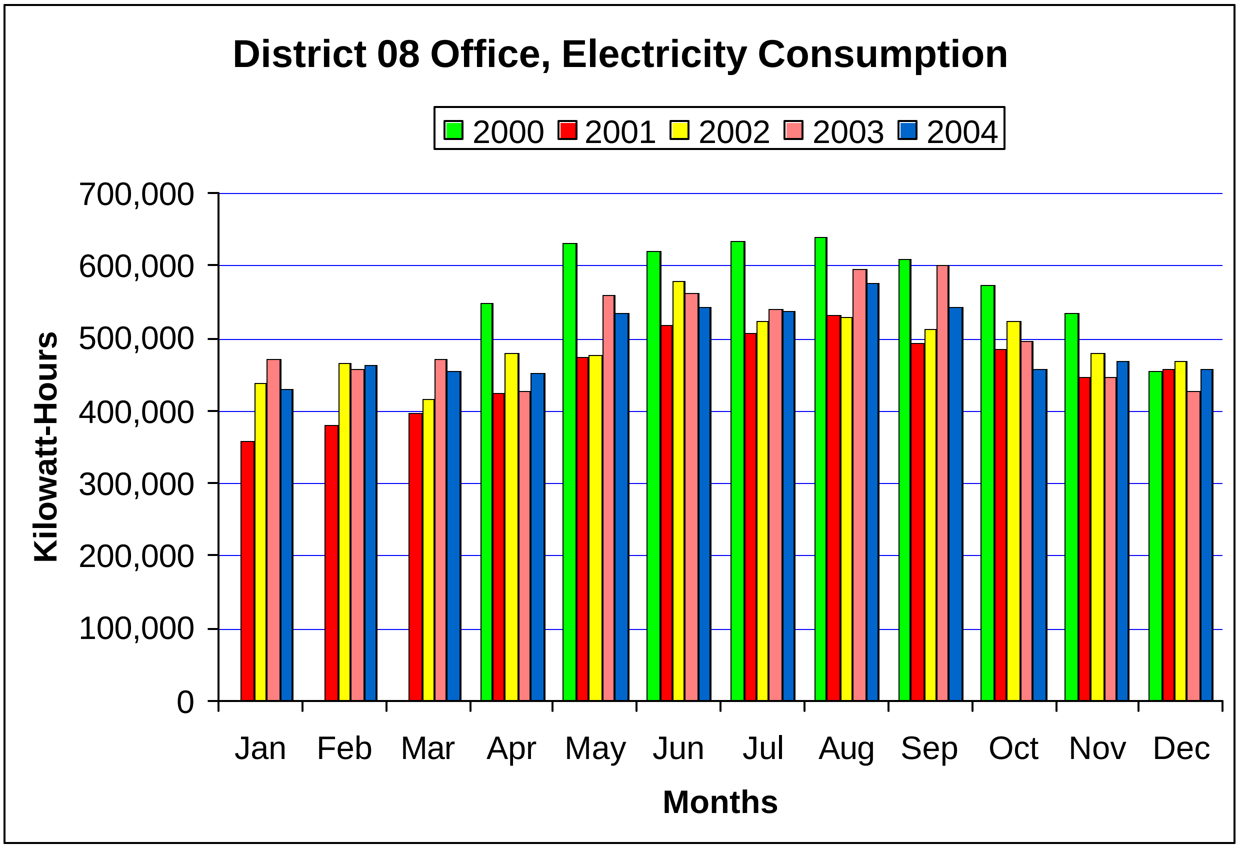
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004			0	31,200	95,200	166,400	276,047	443,153	761,200	645,700	707,200	730,000
2005	731,200	683,600	737,200									
2006												
2007												
2008												



Monthly Electrical Demand

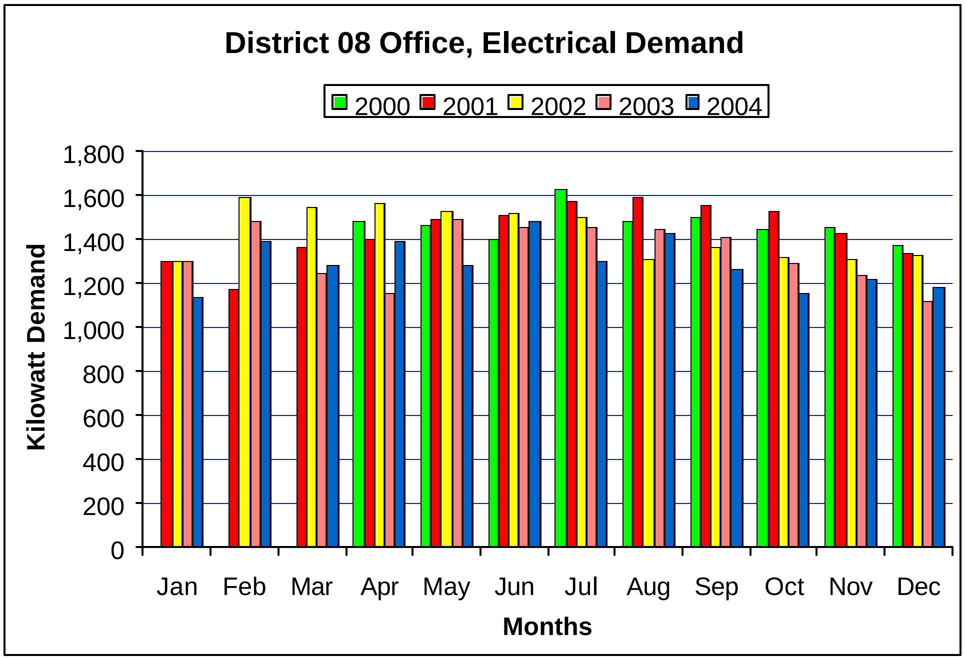
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004			20	244	652	972	1,242	1,288	1,640	1,636	1,692	2,036
2005	2,070	1,856	2,384									
2006												
2007												
2008												

District 08 District Office:
464 West 4th Street
San Bernardino, CA



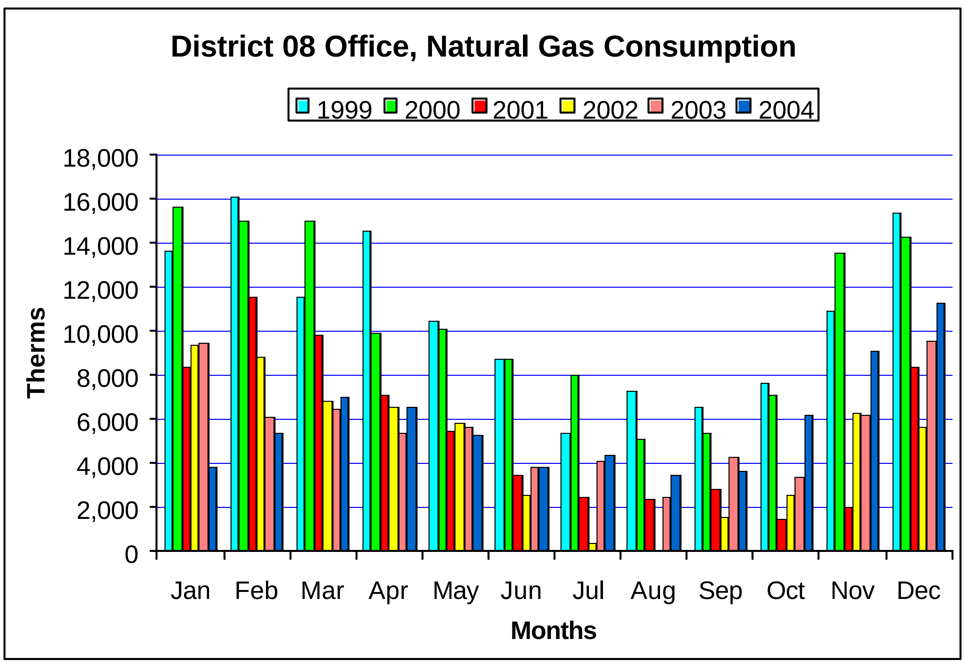
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000				548,387	631,913	621,165	633,991	638,606	608,778	573,634	533,318	454,427
2001	359,086	379,670	395,753	423,177	473,191	518,370	508,014	531,713	492,095	485,240	446,363	457,087
2002	438,842	464,187	415,339	479,444	476,808	577,852	524,130	530,228	511,564	522,235	478,422	468,448
2003	470,375	457,403	471,854	426,602	559,908	562,930	540,256	594,505	601,049	495,992	447,651	426,354
2004	429,164	462,236	454,669	453,029	533,257	541,237	537,788	576,931	543,456	458,163	467,120	458,637



Monthly Electrical Demand

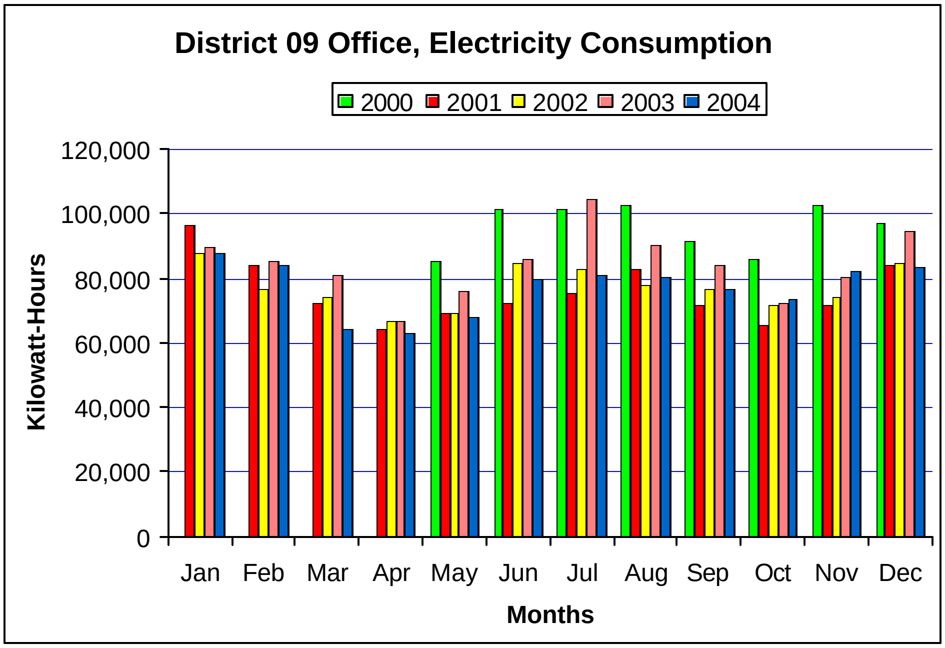
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000				1,479	1,463	1,404	1,627	1,485	1,501	1,443	1,454	1,373
2001	1,303	1,172	1,364	1,402	1,489	1,507	1,569	1,594	1,551	1,524	1,428	1,337
2002	1,296	1,594	1,543	1,565	1,526	1,517	1,502	1,310	1,366	1,320	1,310	1,325
2003	1,303	1,481	1,248	1,152	1,488	1,457	1,457	1,442	1,411	1,291	1,236	1,121
2004	1,133	1,394	1,279	1,394	1,284	1,486	1,303	1,426	1,265	1,157	1,219	1,178



Monthly Natural Gas Consumption

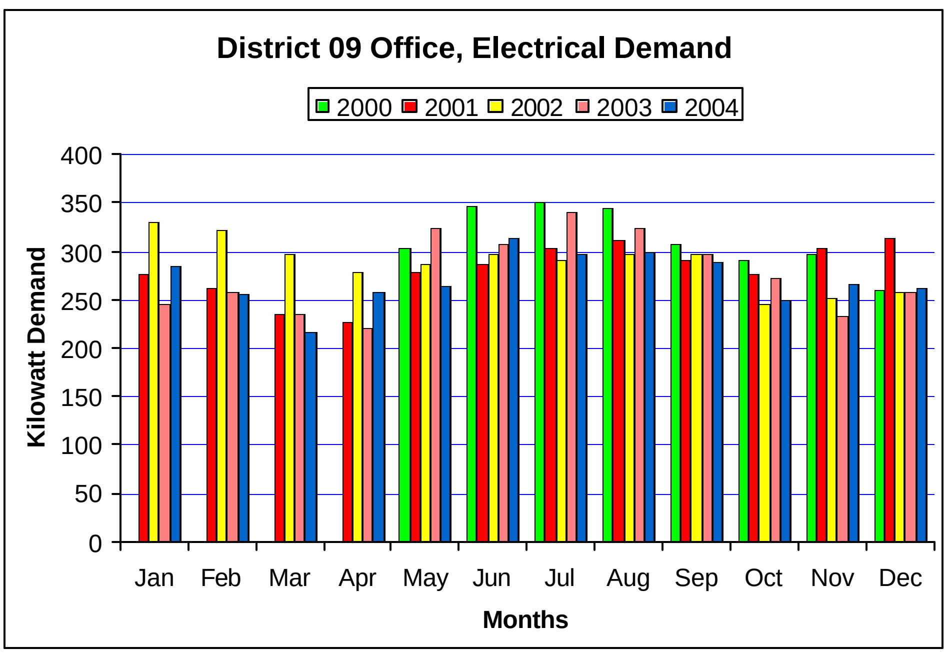
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	13,670	16,074	11,558	14,538	10,417	8,729	5,359	7,275	6,550	7,618	10,935	15,330
2000	15,683	15,035	14,972	9,938	10,087	8,721	8,002	5,081	5,351	7,058	13,513	14,316
2001	8,320	11,546	9,796	7,105	5,421	3,467	2,410	2,312	2,808	1,404	1,979	8,340
2002	9,340	8,794	6,768	6,499	5,811	2,545	355	3	1,495	2,539	6,273	5,641
2003	9,416	6,074	6,396	5,362	5,611	3,776	4,115	2,463	4,279	3,316	6,202	9,573
2004	3,811	5,313	6,963	6,511	5,247	3,808	4,303	3,415	3,644	6,150	9,050	11,299

District 09 District Office:
500 South Main Street
Bishop, CA



Monthly Electricity Consumption

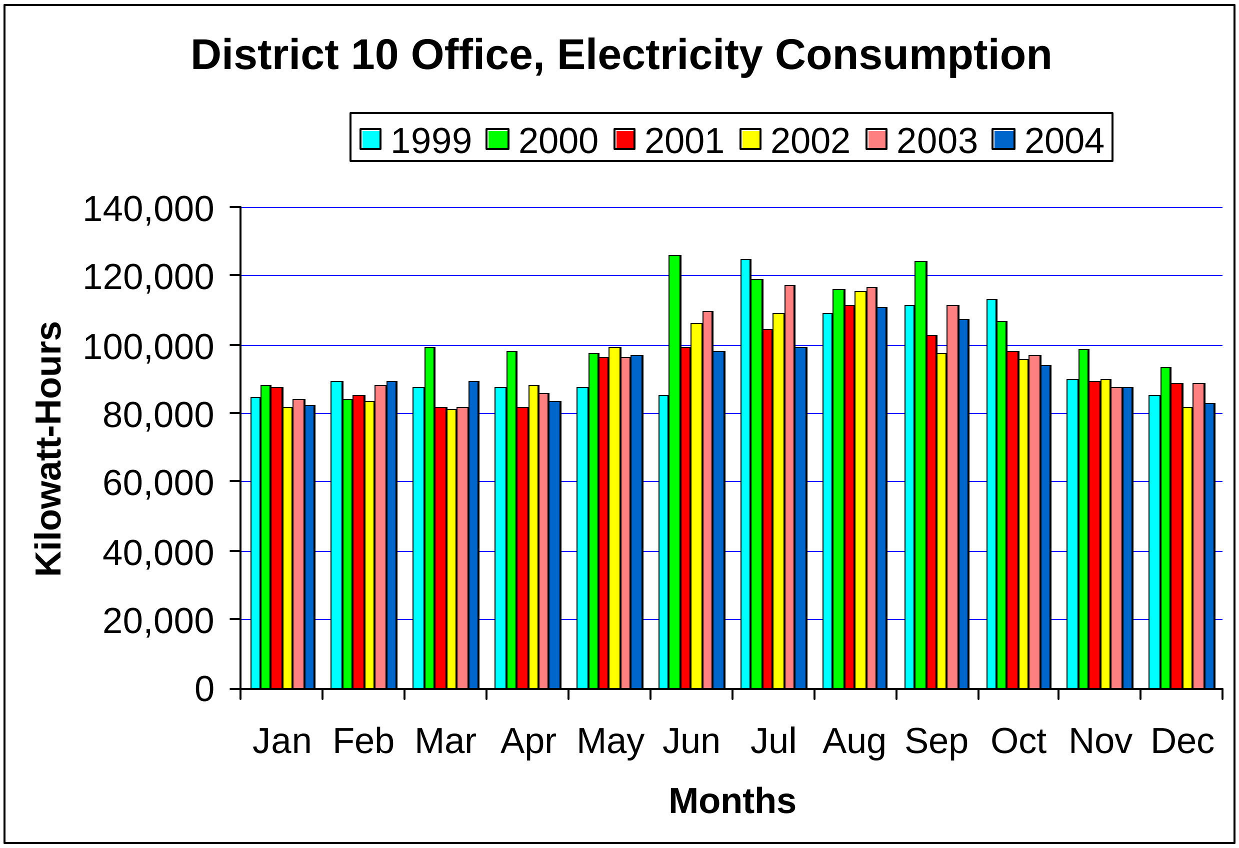
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000					85,161	101,731	101,305	102,797	91,813	85,979	102,633	97,065
2001	96,269	84,328	72,322	64,241	69,096	72,552	75,609	83,066	71,569	65,496	71,815	84,426
2002	87,577	77,031	74,057	66,500	69,411	84,895	82,895	78,048	76,413	71,927	74,444	84,789
2003	89,651	85,335	81,159	66,680	75,803	85,782	104,450	90,374	84,175	72,291	80,455	94,775
2004	88,035	84,380	64,583	62,881	68,028	79,695	81,145	80,120	77,002	73,686	82,267	83,741



Monthly Electrical Demand

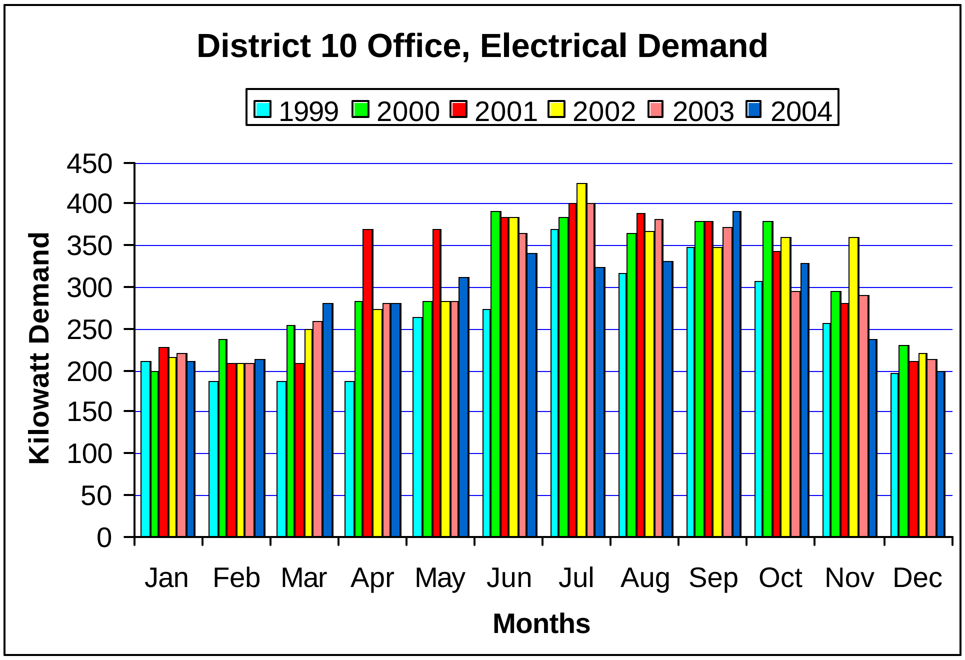
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000					303	346	351	345	308	291	298	260
2001	276	261	234	227	278	286	304	312	291	277	303	314
2002	330	322	297	278	286	297	290	297	298	245	252	257
2003	246	258	236	221	323	308	340	323	298	273	232	257
2004	285	256	216	258	264	313	298	300	288	249	266	261

District 10 District Office:
1976 East Charter Way
Stockton, CA



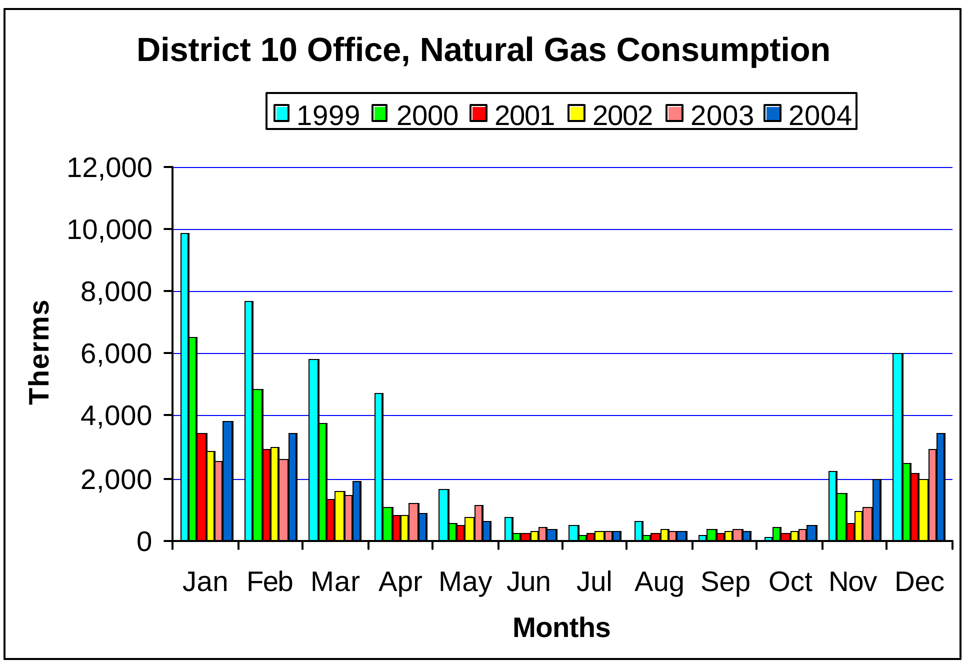
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	84,840	89,520	87,720	87,720	87,720	85,440	124,680	109,320	111,360	113,040	90,120	85,440
2000	87,960	84,000	99,000	98,280	97,320	125,880	119,280	116,400	124,440	107,040	98,640	93,600
2001	87,600	85,560	81,840	81,962	96,598	99,240	104,280	111,480	102,960	98,160	89,162	88,800
2002	81,960	83,400	81,120	88,088	99,480	106,200	109,080	115,320	97,680	95,760	89,640	82,080
2003	84,240	88,320	81,720	85,800	96,240	109,440	117,480	116,640	111,360	97,080	87,840	88,920
2004	82,440	89,400	89,160	83,760	97,080	97,800	99,480	110,760	107,520	93,960	87,600	82,680



Monthly Electrical Demend

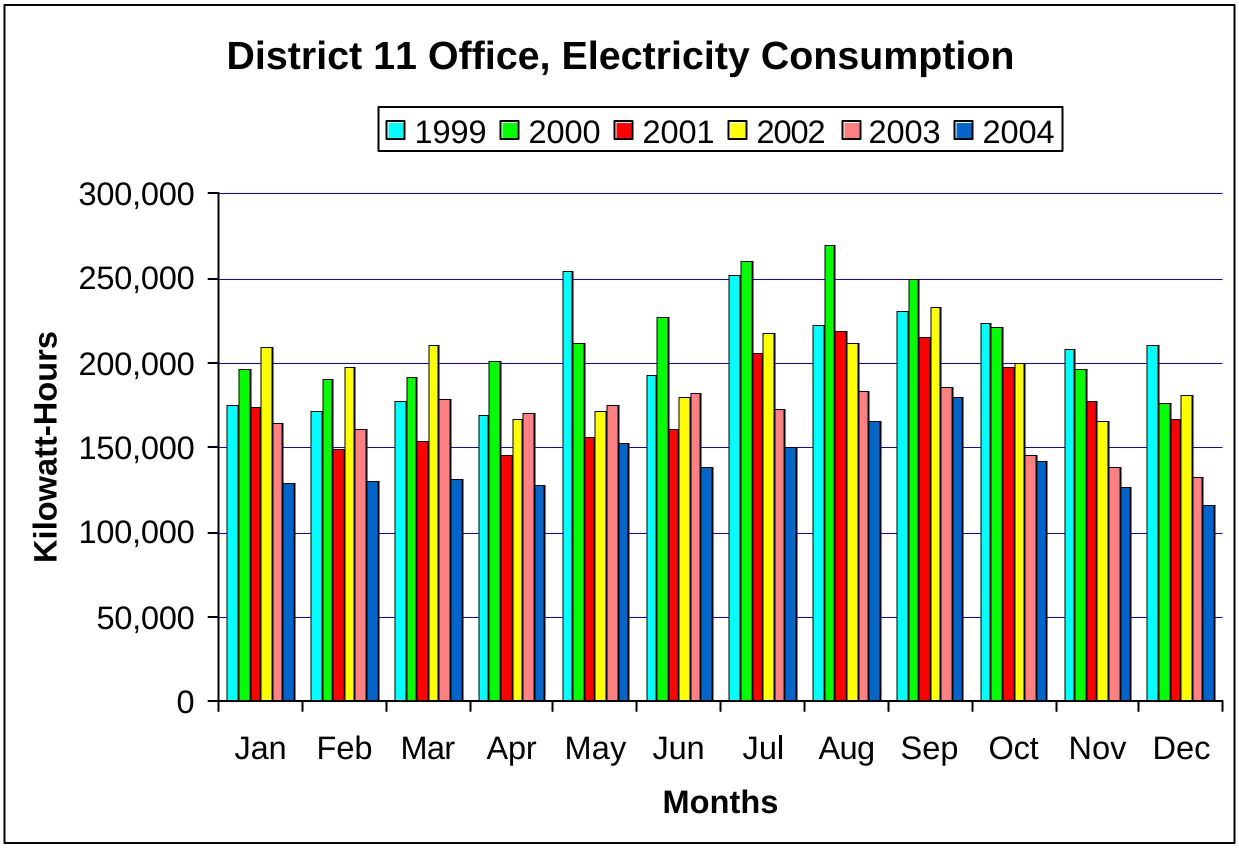
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	211	188	188	188	265	274	370	317	348	307	256	196
2000	198	238	253	284	282	392	385	366	379	379	294	230
2001	228	208	208	370	370	385	401	390	380	344	280	211
2002	216	209	250	274	284	383	424	368	349	361	361	220
2003	220	209	259	280	283	366	401	382	373	294	290	214
2004	211	214	281	280	313	340	323	332	391	329	238	199



Monthly Natural Gas Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	9,873	7,682	5,788	4,746	1,648	728	464	618	182	141	2,217	5,982
2000	6,497	4,869	3,795	1,067	587	209	156	150	390	439	1,500	2,474
2001	3,437	2,931	1,355	811	496	213	230	269	252	258	549	2,189
2002	2,862	3,024	1,586	809	767	293	289	338	317	310	976	1,987
2003	2,558	2,585	1,431	1,195	1,130	423	318	292	341	397	1,107	2,906
2004	3,831	3,427	1,899	894	600	373	323	332	316	501	1,986	3,431

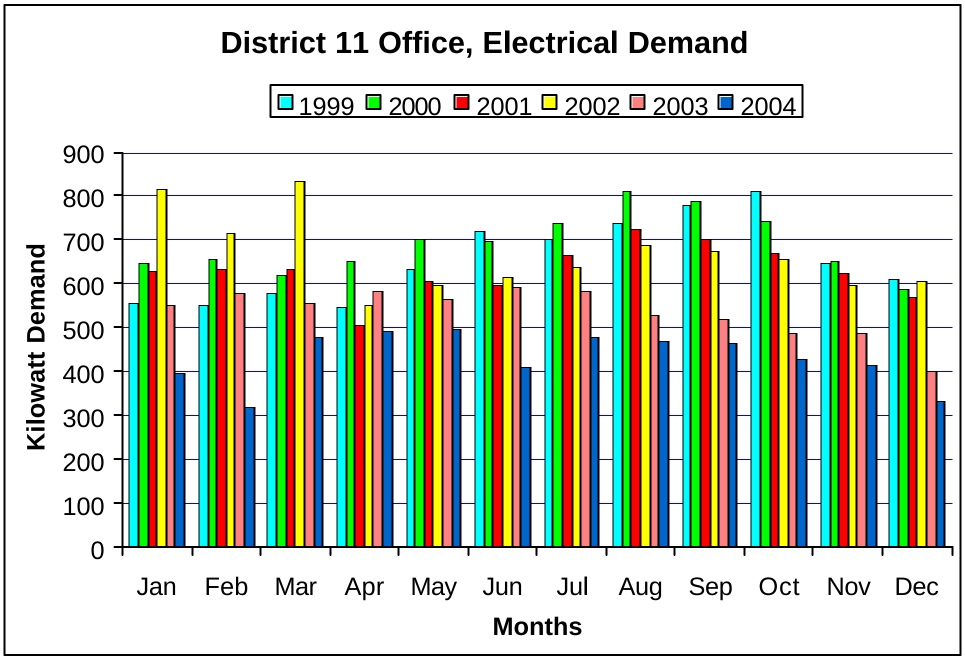
District 11 District Office:
4075 Taylor Street
San Diego, CA



Monthly Electricity Consumption

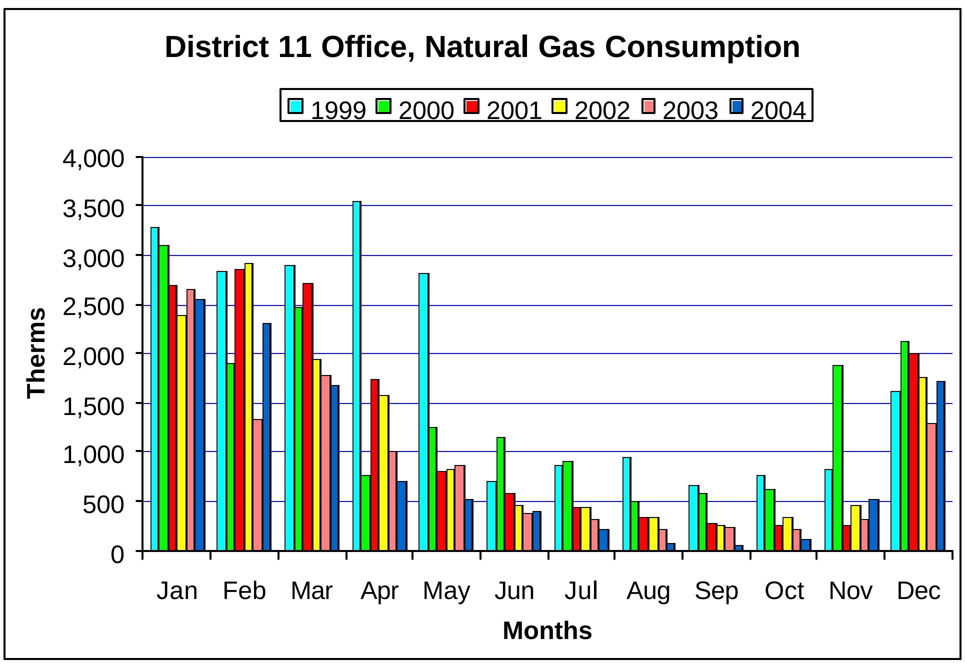
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	175,677	171,177	177,427	168,776	254,671	192,769	252,146	222,203	230,813	223,410	207,680	210,784
2000	196,091	190,288	191,416	201,311	211,565	227,282	260,219	269,933	249,360	221,602	196,118	176,099
2001	174,401	148,630	153,856	145,613	156,611	160,323	205,707	219,033	215,396	197,769	177,470	167,262
2002	209,248	197,565	210,683	166,594	171,040	180,165	218,061	211,259	233,391	199,887	165,422	181,209
2003	163,900	160,399	178,096	169,922	174,862	181,759	172,945	183,931	185,985	145,673	137,979	132,148
2004	128,478	129,936	131,898	127,235	152,091	138,625	149,958	165,098	180,047	142,483	126,590	116,089

Note: From July 2003 on you can see the movement of staff out of this facility as the District Office complex moves toward replacement scheduled for 2006/07 FY. 25 active meters at the DO are as of September 2004 are down to 11.
(Mostly small on site temp buildings or small out buildings.)



Monthly Electrical Demand

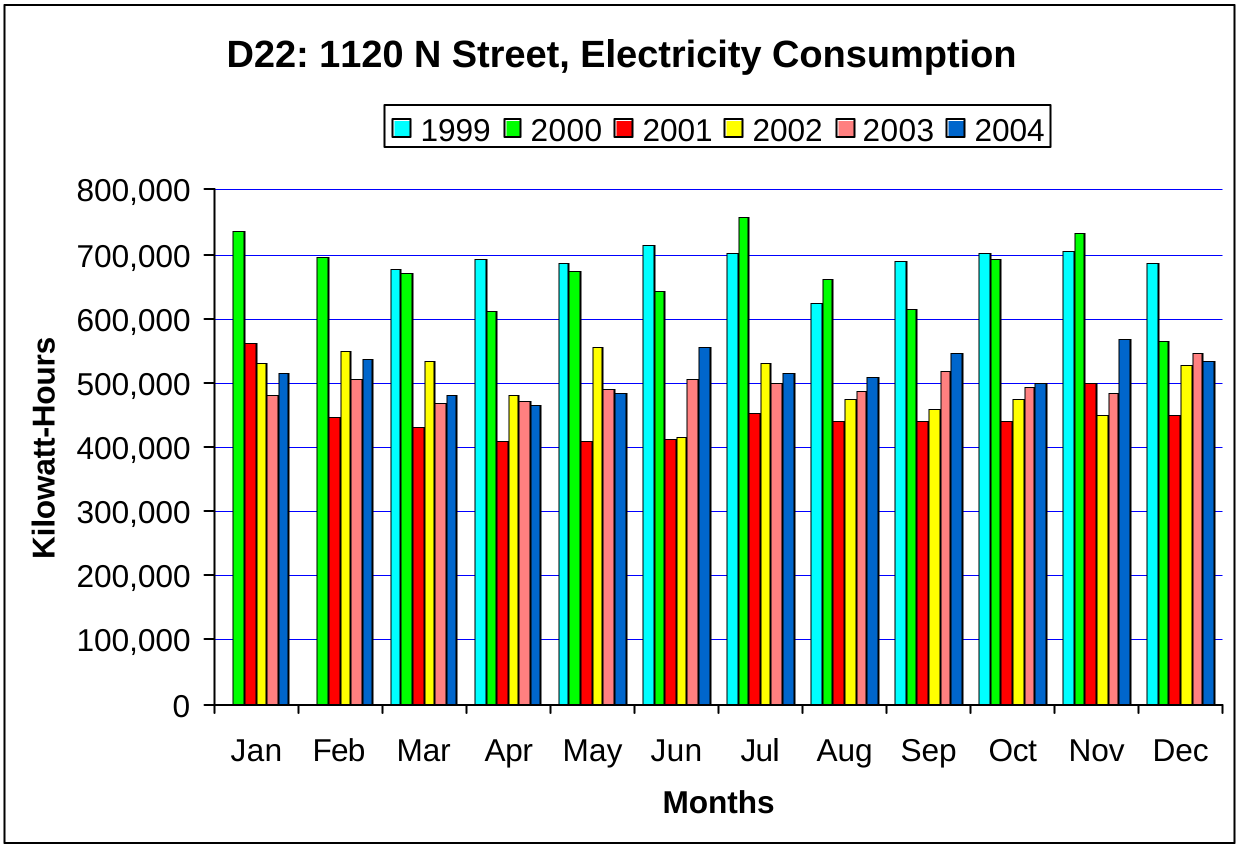
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	556	553	578	546	632	718	703	738	778	811	647	612
2000	646	654	622	650	700	697	740	812	788	744	653	586
2001	629	631	631	506	608	597	667	726	703	668	622	571
2002	816	716	835	552	597	614	638	690	672	654	598	607
2003	550	579	557	583	564	592	584	528	520	486	487	402
2004	398	319	476	492	495	411	476	471	466	430	414	330



Monthly Natural Gas Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	3,277	2,843	2,904	3,545	2,822	702	870	958	656	761	825	1,624
2000	3,092	1,909	2,461	765	1,251	1,147	898	491	573	616	1,887	2,129
2001	2,701	2,865	2,718	1,738	814	589	443	340	287	260	248	2,012
2002	2,385	2,919	1,934	1,573	830	452	447	332	248	337	452	1,755
2003	2,657	1,337	1,777	998	871	388	324	216	236	219	325	1,289
2004	2,545	2,298	1,685	697	527	408	224	71	55	112	525	1,716

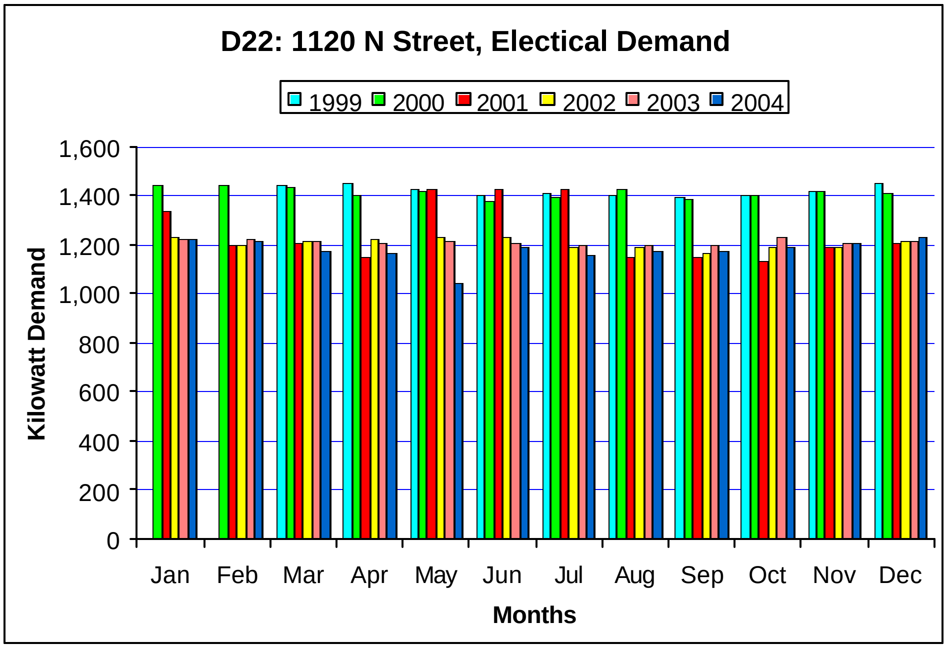
Headquarters Building:
1120 N Street
Sacramento, CA



Note: No Chillers on site, Cooling/heating from DGS Central Plant

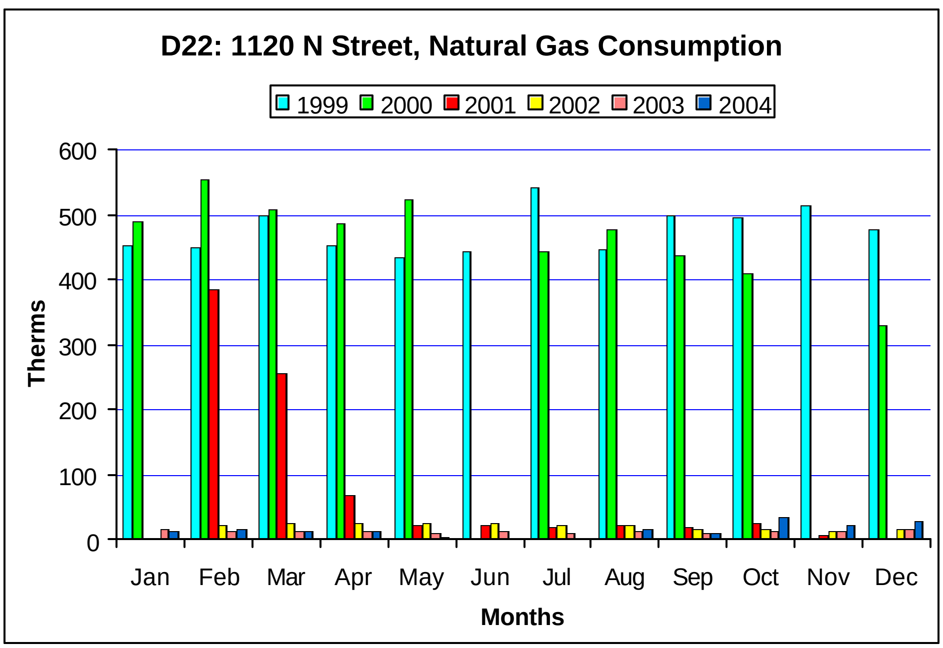
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999			678,000	693,000	686,400	712,800	701,400	622,800	690,600	701,400	705,600	687,000
2000	736,200	695,400	669,600	612,600	675,000	643,200	756,600	660,000	615,000	691,200	733,800	565,800
2001	560,400	447,600	430,800	410,400	409,200	412,800	453,600	439,200	439,200	440,400	500,400	450,600
2002	529,200	550,800	533,400	480,600	555,000	416,400	531,000	474,000	460,200	475,200	448,800	526,800
2003	482,400	504,600	469,200	472,800	490,800	505,200	501,000	487,200	518,400	492,600	483,000	545,600
2004	515,400	538,200	482,400	465,600	485,400	555,600	516,600	508,200	545,400	499,800	567,600	533,400



Monthly Electrical Demand

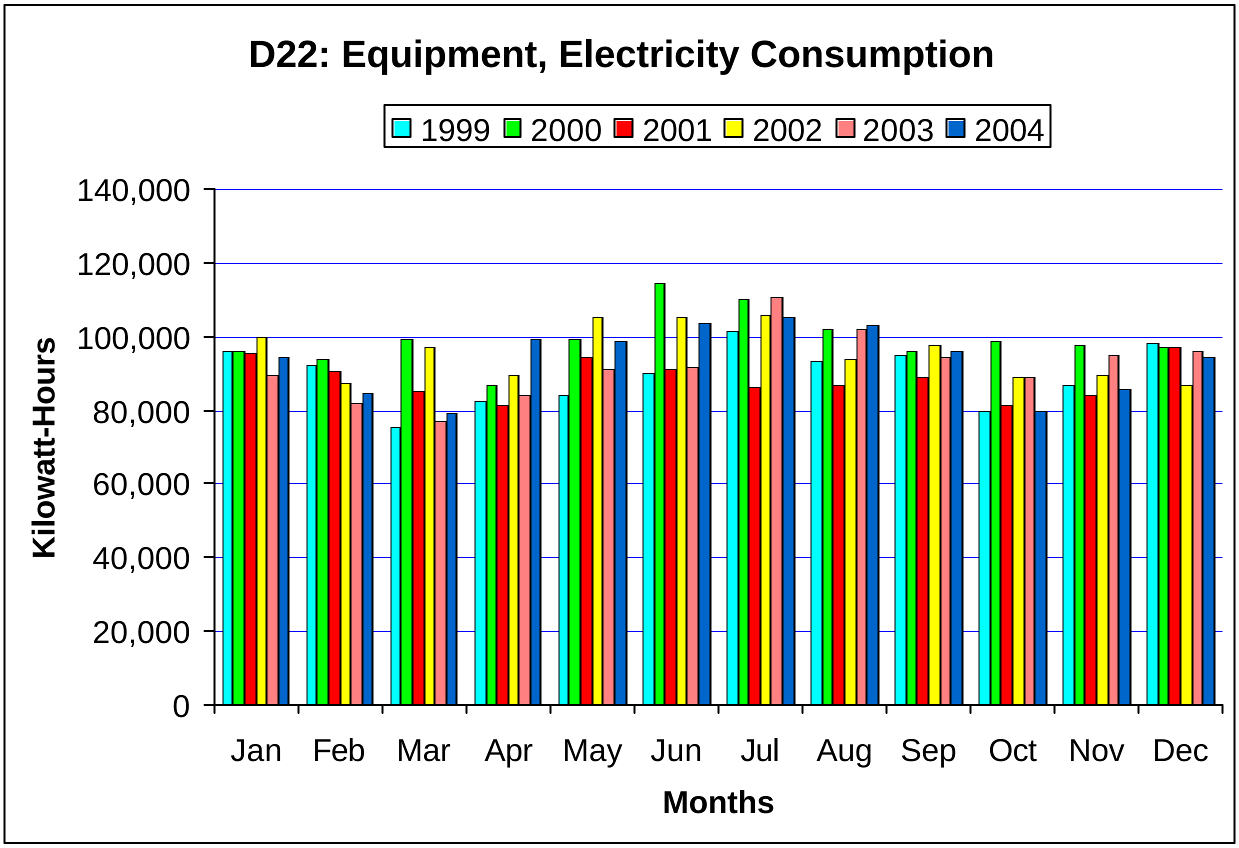
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999			1,440	1,452	1,428	1,404	1,410	1,398	1,392	1,404	1,416	1,452
2000	1,446	1,440	1,434	1,404	1,416	1,380	1,392	1,428	1,386	1,400	1,418	1,409
2001	1,337	1,198	1,205	1,148	1,428	1,428	1,428	1,146	1,146	1,134	1,190	1,203
2002	1,234	1,201	1,217	1,225	1,229	1,229	1,192	1,192	1,167	1,190	1,187	1,216
2003	1,226	1,225	1,217	1,202	1,210	1,206	1,196	1,196	1,201	1,231	1,206	1,214
2004	1,220	1,212	1,176	1,164	1,042	1,191	1,157	1,176	1,175	1,188	1,205	1,232



Monthly Natural Gas Consumption

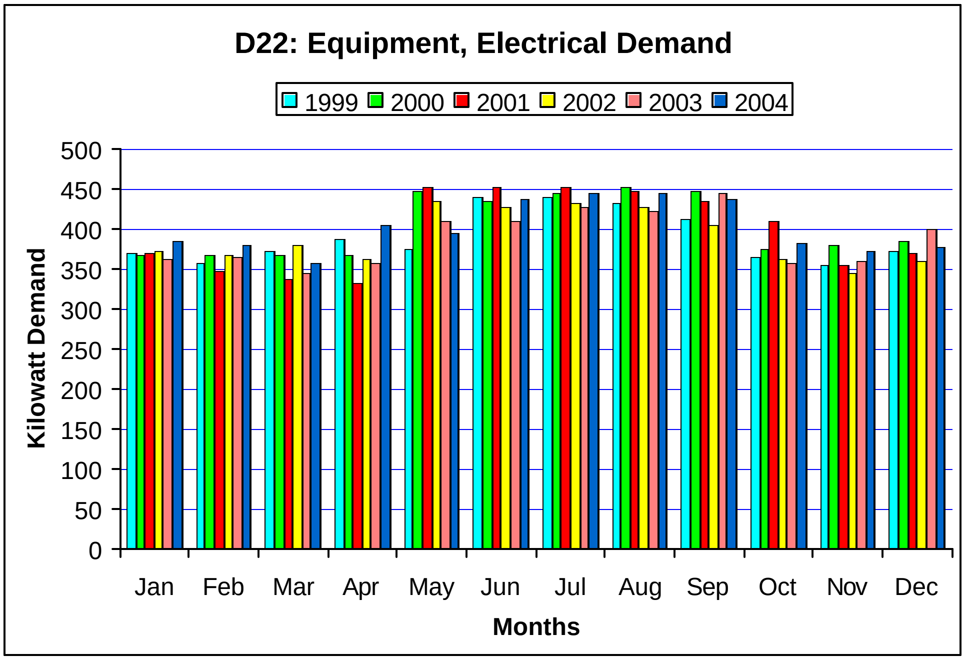
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	452	449	499	452	433	444	541	447	499	496	515	479
2000	490	555	509	487	523	0	445	477	439	409	0	329
2001	0	386	257	70	23	22	20	23	21	26	7	0
2002	0	22	26	27	26	26	24	24	16	16	14	15
2003	17	13	13	14	10	12	11	12	10	13	14	16
2004	13	16	14	13	3	0	2	17	10	35	22	28

Division of Equipment:
1805 34th Street
Sacramento, CA



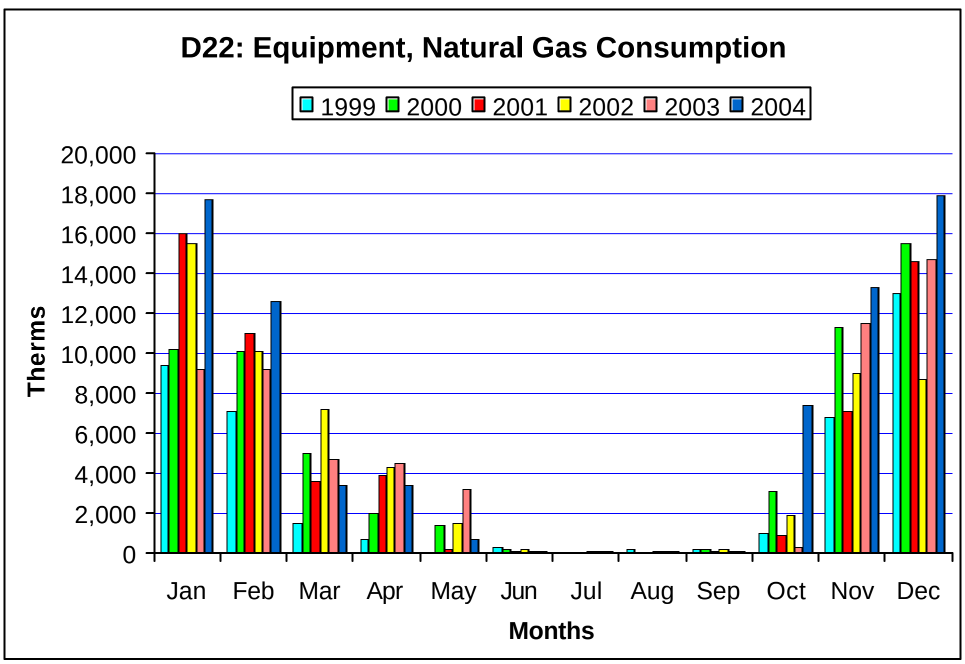
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	96,000	92,400	75,600	82,800	84,000	90,000	101,600	93,200	95,200	79,600	86,800	98,400
2000	96,400	94,000	99,600	86,800	99,600	114,800	110,400	102,400	96,400	98,800	97,600	97,200
2001	95,600	90,800	85,200	81,200	94,400	91,200	86,400	86,800	89,200	81,200	84,400	97,200
2002	100,000	87,200	97,200	89,600	105,600	105,200	106,000	94,000	97,600	88,800	89800	86800
2003	89,600	82,000	76,900	84,000	91,200	92,000	110,800	102,400	94,800	88,800	95200	96000
2004	94,400	84,800	79,200	99,200	98,800	104,000	105,600	103,200	96,000	80,000	86000	94800



Monthly Electrical Demand

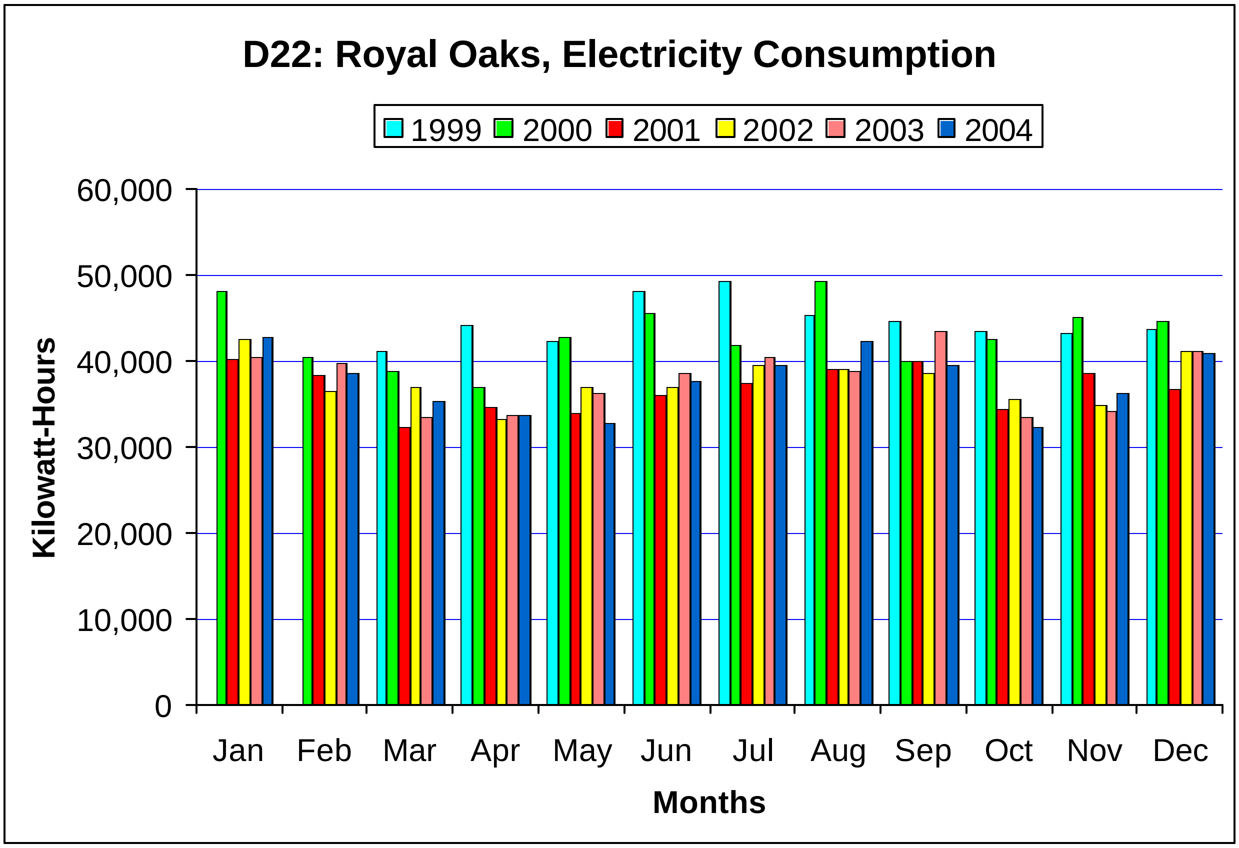
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	369.5	358	372	388	376	440	440	432	412	364	356	372
2000	368	368	368	368	448	436	444	452	448	376	381	385
2001	371	348	337	332	452	452	452	448	435	411	354	369
2002	372	367	380	363	436	427	432	428	406	363	346	359
2003	362	364	345	358	409	411	427	422	446	357	360	401
2004	386	381	358	406	394	438	446	444	438	383	372	377



Monthly Natural Gas Consumption

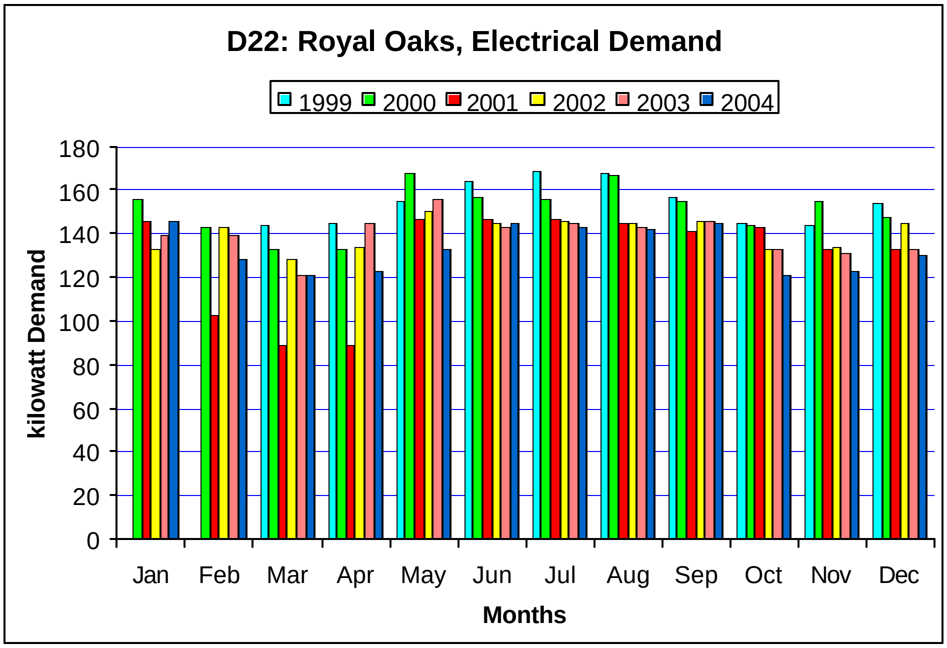
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	9,401	7,135	1,460	728	0	245	0	207	164	1,036	6,828	12,949
2000	10,213	10,083	5,008	1,973	1,356	178	0	0	209	3,135	11,287	15,500
2001	16,000	11,000	3,626	3,933	220	86	0	0	97	861	7,057	14,635
2002	15,499	10,081	7,181	4,310	1,535	161	86	88	243	1,935	8,996	8,715
2003	9,231	9,184	4,743	4,499	3,207	110	86	73	89	337	11,507	14,704
2004	17,719	12,595	3,369	3,411	652	100	106	129	86	7,404	13,303	17,898

Department Northern California Warehouse:
1900 Royal Oaks Drive
Sacramento, CA



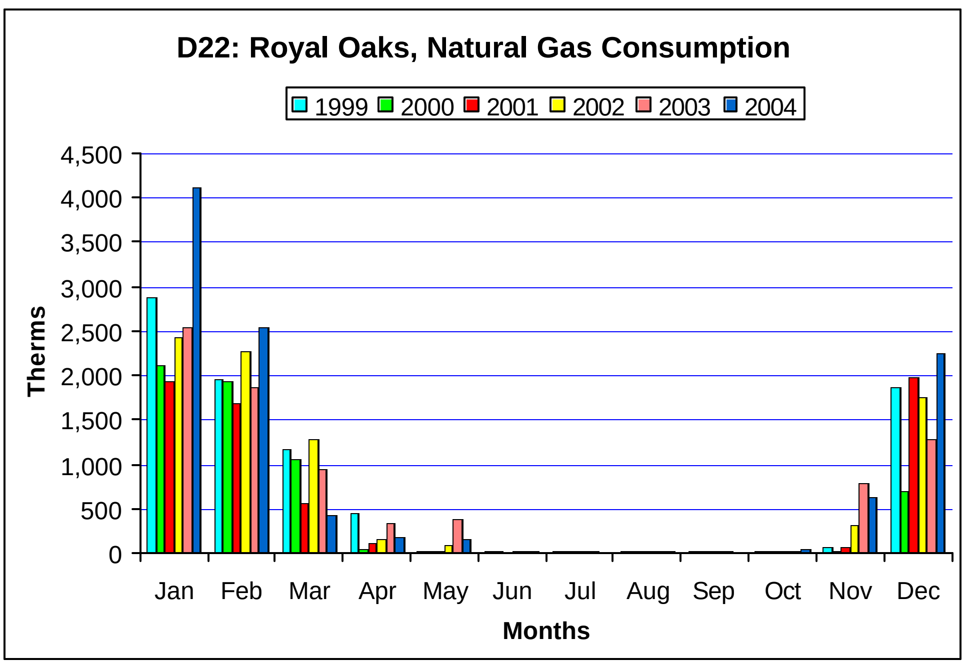
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999			41,160	44,160	42,480	48,120	49,440	45,480	44,640	43,440	43,320	43,680
2000	48,120	40,560	38,880	36,960	42,840	45,720	42,000	49,440	39,960	42,600	45,240	44,640
2001	40,200	38,520	32,280	34,680	34,080	36,000	37,560	39,000	39,960	34,560	38,640	36,720
2002	42,720	36,480	36,960	33,360	37,080	37,080	39,480	39,120	38,760	35,520	34,800	41,160
2003	40,560	39,720	33,600	33,720	36,240	38,760	40,440	38,880	43,520	33,480	34,320	41,280
2004	42,840	38,640	35,400	33,840	32,880	37,800	39,600	42,480	39,480	32,400	36,360	41,040



Monthly Electrical Demand

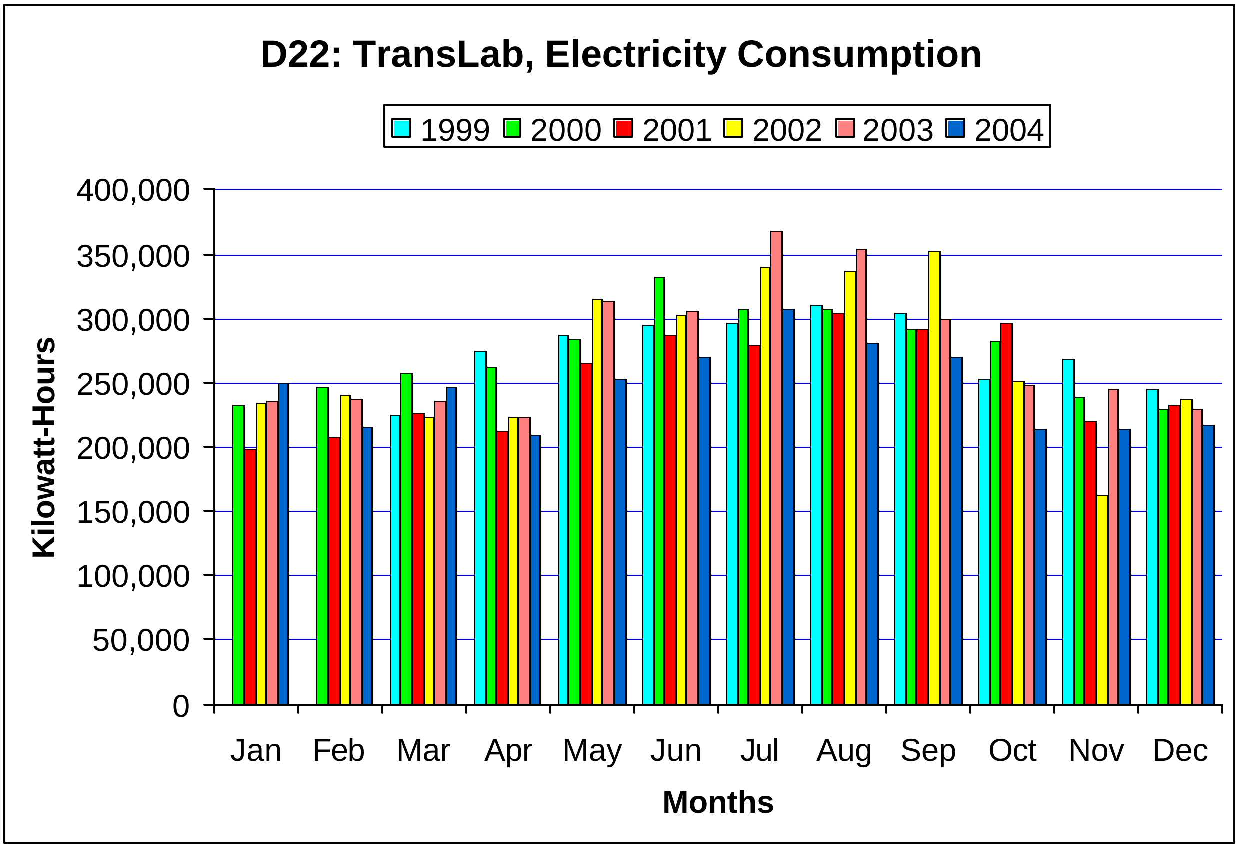
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999			144	145	155	164	169	168	157	145	144	154
2000	156	143	133	133	168	157	156	167	155	144	155	148
2001	146	103	89	89	147	147	147	145	141	143	133	133
2002	133	143	128	134	150	145	146	145	146	133	134	145
2003	139	139	121	145	156	143	145	143	146	133	131	133
2004	146	128	121	123	133	145	143	142	145	121	123	130



Monthly Natural Gas Consumption

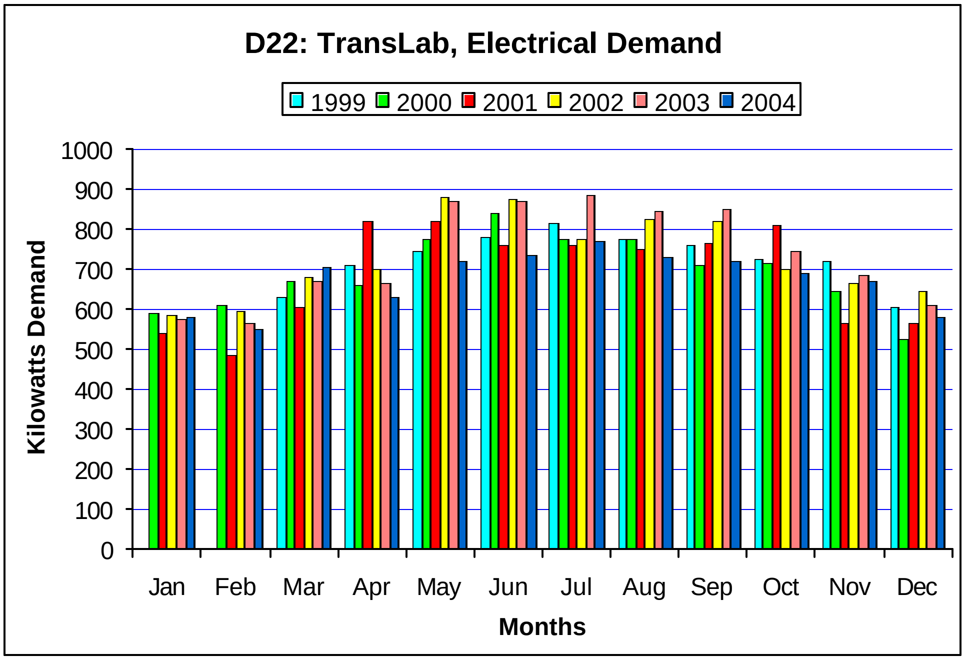
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	2,883	1,968	1,162	453	12	14	11	13	12	20	60	1,862
2000	2,122	1,935	1,049	45	11	12	12	11	11	15	30	700
2001	1,945	1,695	569	113	11	0	22	12	11	16	64	1,989
2002	2,432	2,274	1,271	147	88	16	15	13	14	19	325	1,749
2003	2,542	1,878	952	347	383	15	13	13	14	17	786	1,270
2004	4,122	2,540	435	168	150	14	10	13	7	52	630	2,250

METS (Translab):
5900 Folsom Blvd.
Sacramento, CA



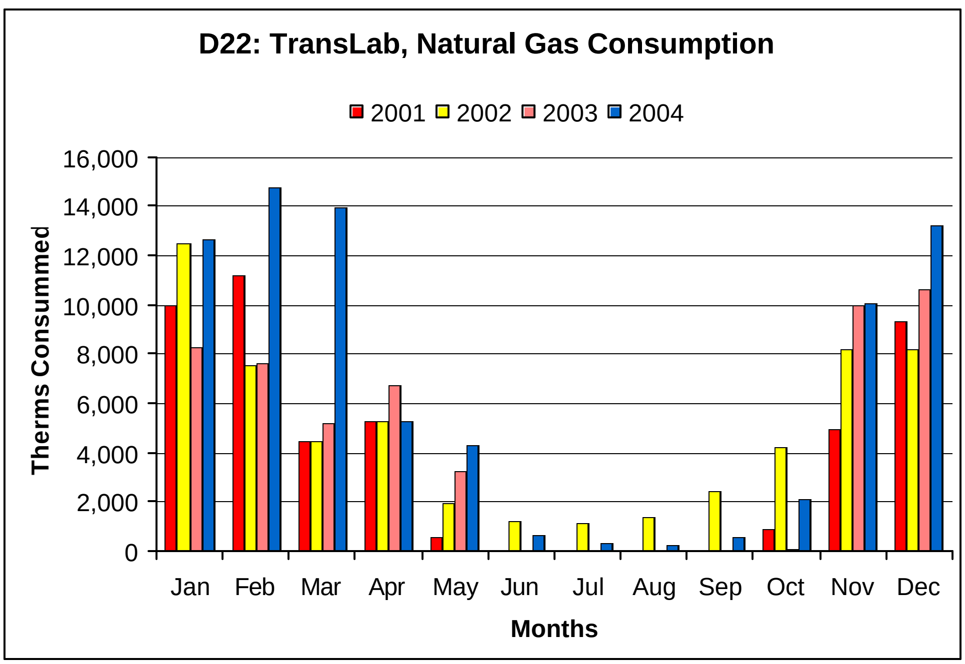
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999			224,600	274,240	287,360	294,560	295,920	309,840	304,120	253,400	268,640	245,400
2000	232,440	246,800	257,120	261,520	284,120	332,760	307,840	307,080	291,840	282,200	239,360	228,960
2001	197,880	208,240	226,440	212,720	264,600	287,760	278,600	304,080	291,160	296,400	220920	232000
2002	234,560	240,960	222,680	224,120	315,760	302,400	340,800	337,320	352,520	251,400	162520	237520
2003	235,160	237,600	235,520	223,520	314,160	305,480	368,480	354,720	298,920	248,320	244480	229480
2004	250,320	215,720	247,360	209,639	253,480	270,360	307,720	281,560	269,600	213,600	214240	217760



Monthly Electricity Demand

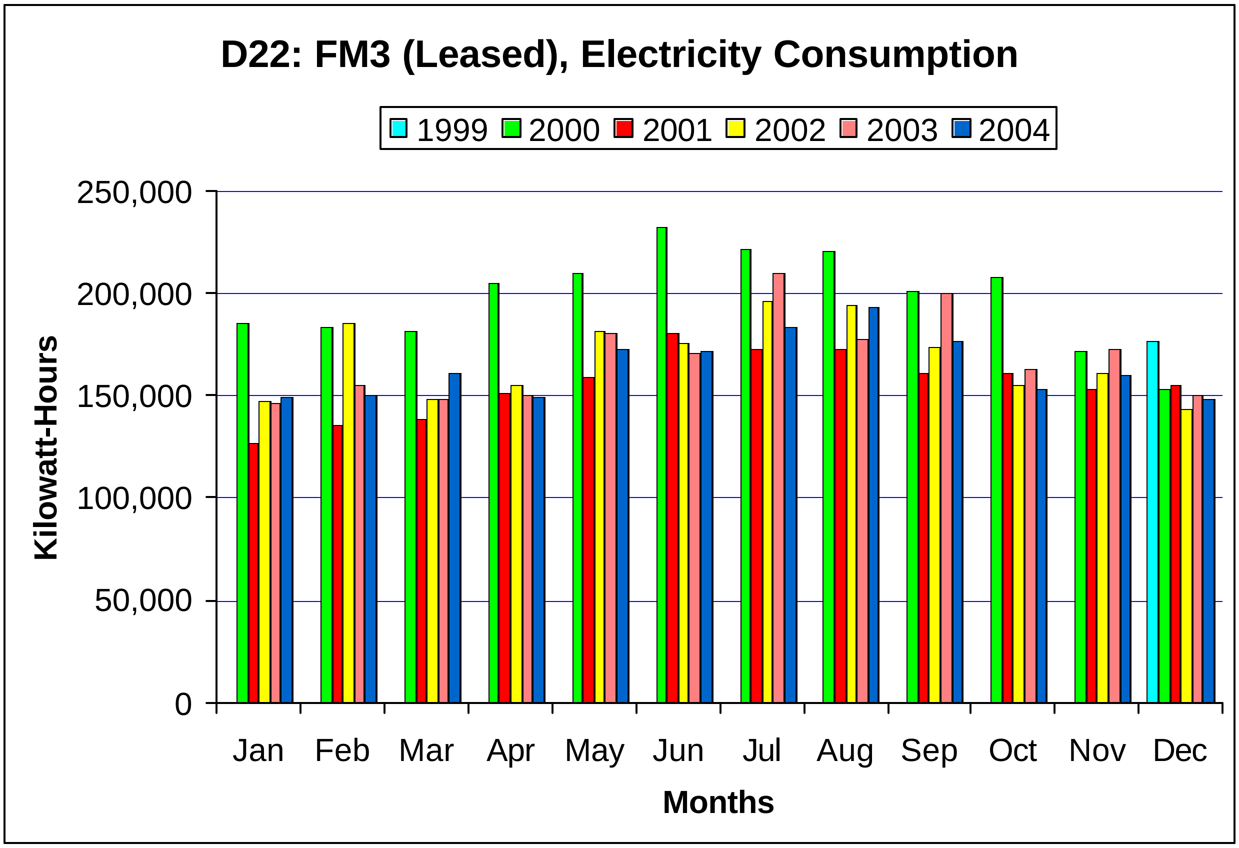
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999			632	712	743	782	813	777	759	726	720	607
2000	590	610	668	662	776	839	776	777	710	714	644	524
2001	542	483	604	819	819	760	760	752	764	811	566	563
2002	587	594	679	699	881	877	775	826	820	702	664	645
2003	576	566	672	667	870	871	886	847	851	745	684	608
2004	578	552	704	630	719	735	769	728	718	689	671	580



Monthly Natural Gas Consumption

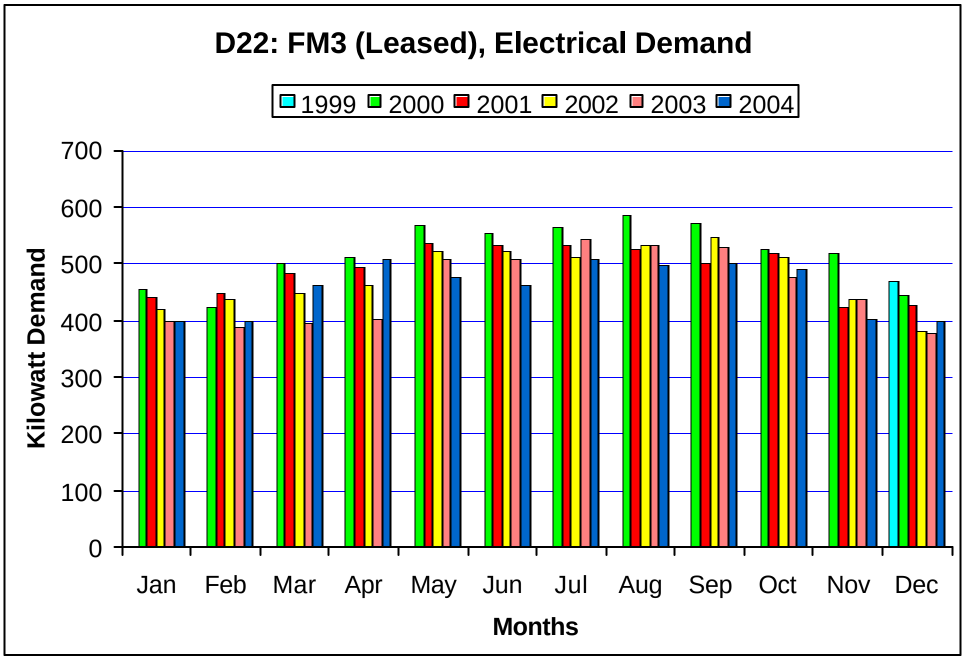
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	10,000	11,198	4,485	5,248	530	0	0	0	3	848	4,937	9,309
2002	12,523	7,541	4,484	5,248	1,943	1,218	1,126	1,324	2,384	4,182	8,182	8,182
2003	8,296	7,620	5,175	6,689	3,246	5	5	4	5	30	9,997	10,627
2004	12,681	14,787	13,952	5,290	4,276	652	312	264	561	2,087	10,029	13,203

FM 3 (Leased Space)
1727 30th Street
Sacramento, CA



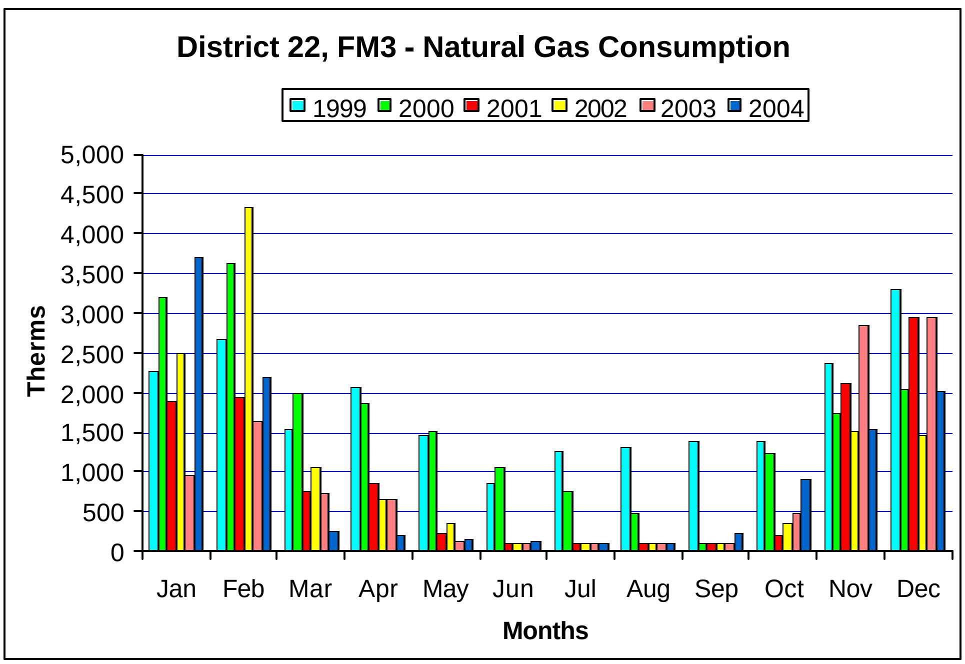
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999												176,400
2000	185,200	184,000	182,000	205,600	209,600	232,400	221,600	220,600	201,200	208,400	171,800	153,200
2001	126,800	136,000	138,400	151,200	159,600	180,800	172,800	172,800	161,200	161,200	153,600	154,800
2002	147,200	185,200	148,000	154,800	181,200	176,000	196,800	194,800	173,600	155,600	161,600	143,600
2003	146,000	155,600	148,000	150,800	180,800	170,800	210,000	177,600	200,400	163,200	172,800	150,800
2004	149,600	150,000	161,200	149,200	173,200	171,600	183,600	193,200	176,400	153,200	160,400	148,800



Monthly Electrical Demand

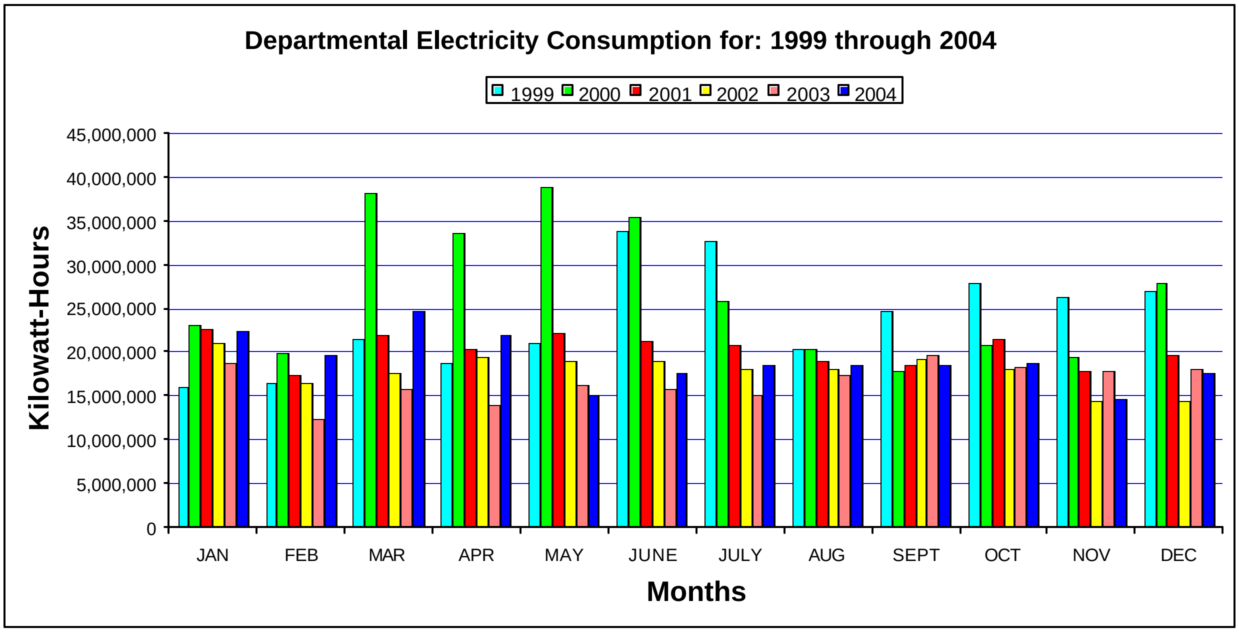
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999												468
2000	456	424	500	512	568	552	564	584	572	525	519	444
2001	440	448	483	494	537	534	531	527	500	520	423	428
2002	419	436	448	462	522	522	513	533	547	512	437	383
2003	398	388	397	402	509	508	545	533	529	475	439	379
2004	399	398	461	508	476	462	507	498	502	490	404	400



Monthly Natural Gas Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	2,280	2,664	1,547	2,066	1,468	871	1,265	1,306	1,398	1,399	2,371	3,308
2000	3,202	3,639	1,981	1,857	1,503	1,067	750	473	115	1,243	1,739	2,048
2001	1,882	1,950	762	861	219	110	94	103	107	206	2,114	2,945
2002	2,483	4,326	1,052	670	367	106	108	116	112	358	1,517	1,469
2003	972	1,641	742	657	123	116	105	113	112	488	2,843	2,939
2004	3,706	2,195	269	214	160	142	113	109	219	904	1,550	2,024

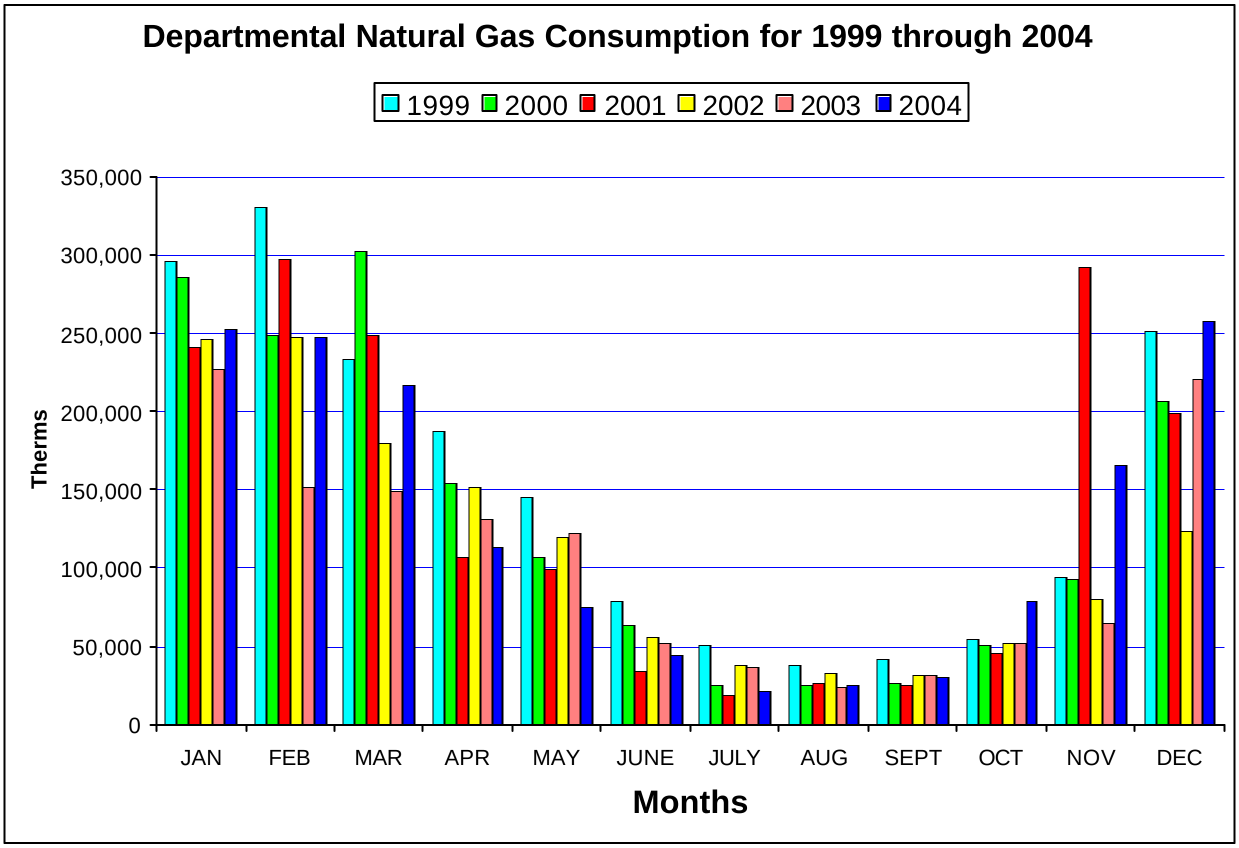
Statewide Monthly Kilowatt-hour Monthly Consumption: 1999 through 2004



Statewide Monthly Electricity Consumption

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1999	15,977,649	16,455,598	21,594,016	18,640,962	20,991,202	33,927,891	32,736,951	20,434,049	24,780,449	27,907,822	26,177,770	26,893,266
2000	23,029,237	19,971,022	38,089,647	33,517,413	38,741,696	35,328,206	25,841,990	20,294,892	17,939,252	20,808,547	19,408,094	27,899,637
2001	22,595,089	17,464,201	21,933,925	20,384,830	22,253,180	21,308,885	20,916,509	18,860,023	18,485,659	21,569,041	17,832,076	19,580,088
2002	20,935,395	16,456,610	17,486,772	19,464,606	19,009,953	18,985,948	18,054,241	18,084,314	19,304,947	18,056,997	14,473,415	14,324,478
2003	18,776,992	12,384,476	15,670,712	14,018,609	16,210,072	15,668,057	15,048,021	17,467,364	19,562,646	18,387,433	17,837,555	18,119,195
2004	22,490,839	19,585,309	24,742,246	21,973,025	15,123,438	17,662,016	18,418,305	18,601,475	18,563,111	18,646,471	14,639,849	17,685,106

Statewide Monthly Natural Gas (Therms) Consumption: 1999 through 2004

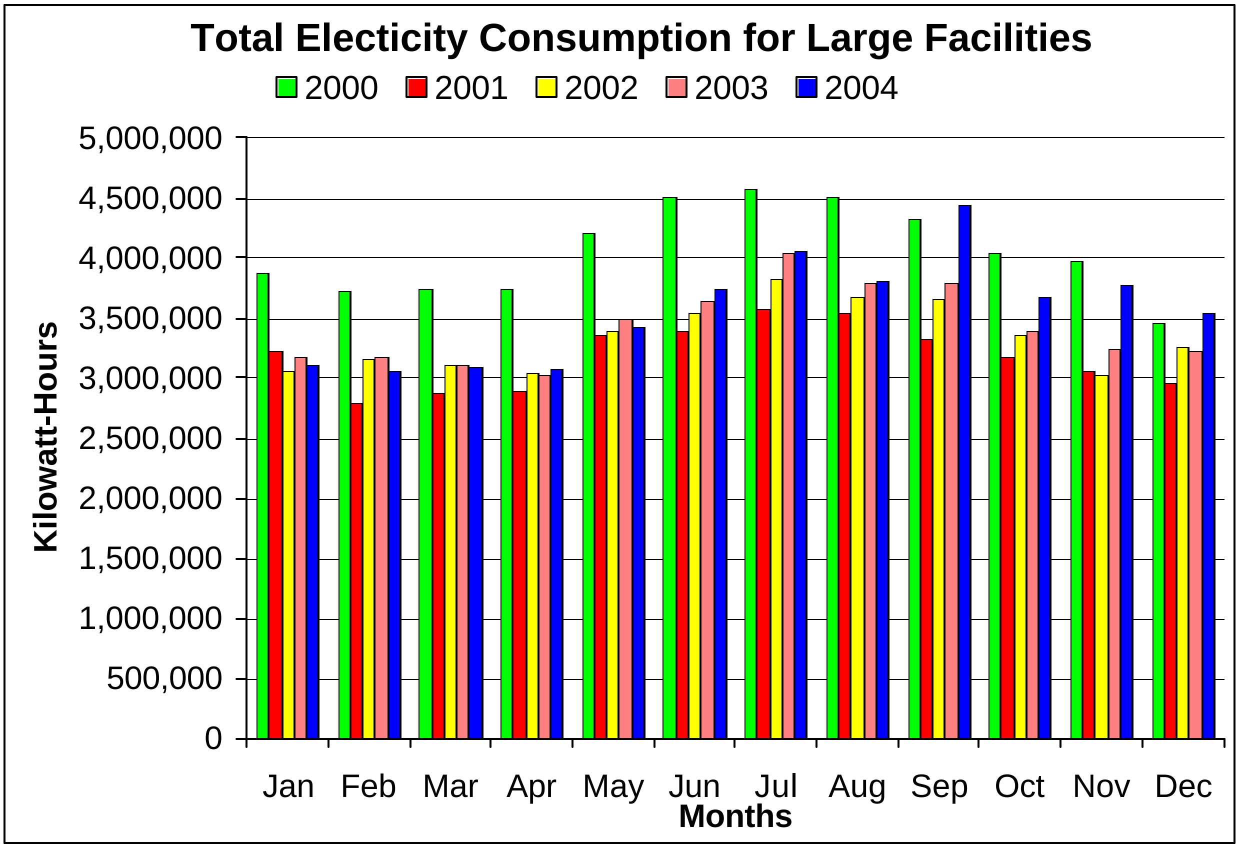


Statewide Monthly Natural Gas Consumption

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1999	295,421	329,725	233,633	187,162	145,702	79,393	50,765	38,398	42,246	54,155	93,548	251,747
2000	284,955	248,444	302,627	154,104	106,902	63,073	25,805	25,644	26,101	50,351	92,768	206,259
2001	240,465	297,504	248,658	107,135	99,427	34,469	19,055	25,918	24,931	45,827	291,543	198,244
2002	246,132	247,040	179,511	152,137	120,037	56,484	37,419	33,132	31,013	52,157	79,707	123,164
2003	227,152	151,163	148,856	131,122	122,773	51,791	37,049	24,537	31,047	52,231	65,168	220,204
2004	252,435	246,960	216,526	113,558	74,898	44,050	21,530	24,626	29,854	79,009	165,855	257,633

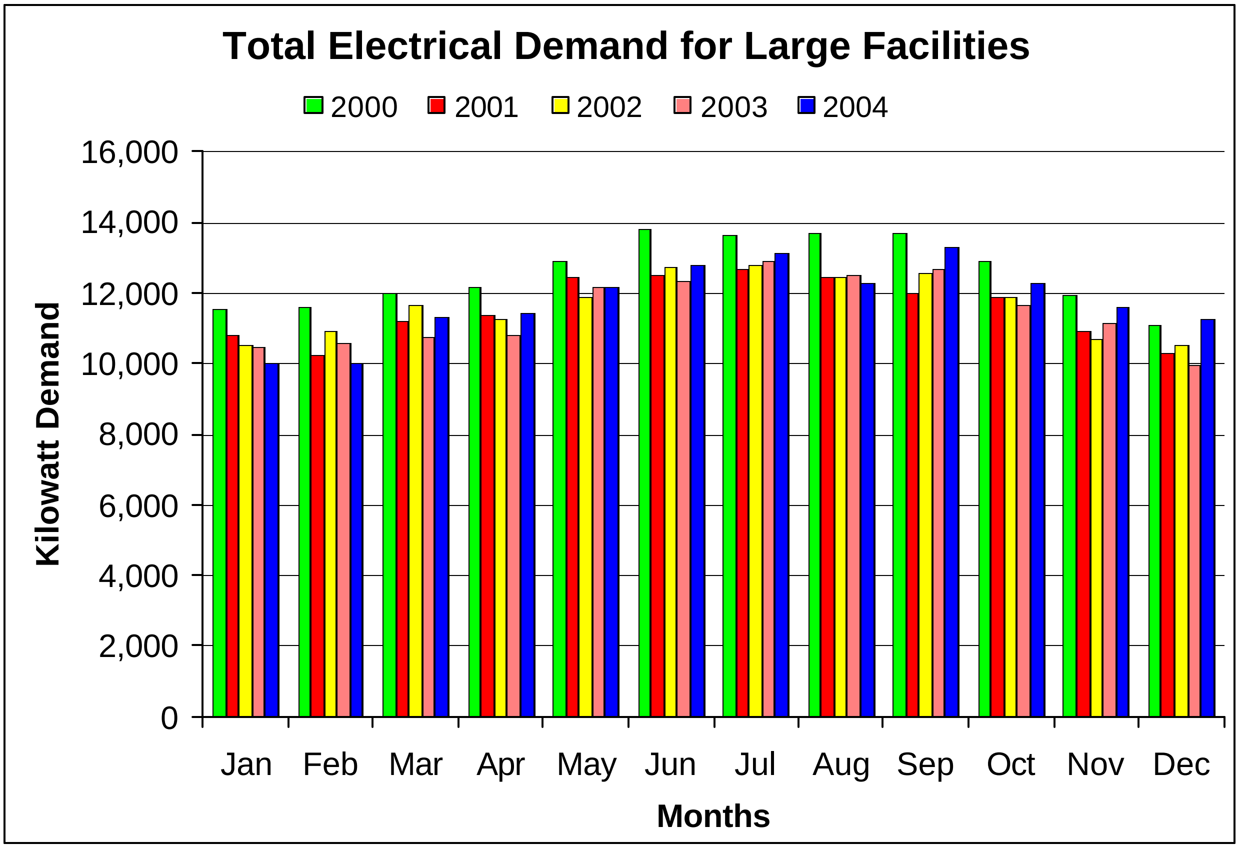
State wide totals for the 17 district and HQ facilities documented in pages 49 through 80.

Since some of the facilities do not have historical data for 1998 and 1999, the charting starts in Calendar Year 2000. Interested parties can compare individual facility profiles with the average profiles for the 17 facilities. (Notice, the last 4 months of 2004, you can see the impact of the new District Office in LA coming on line as staff move into the facility, the same holds true for KW Demand and Natural Gas Therms.)



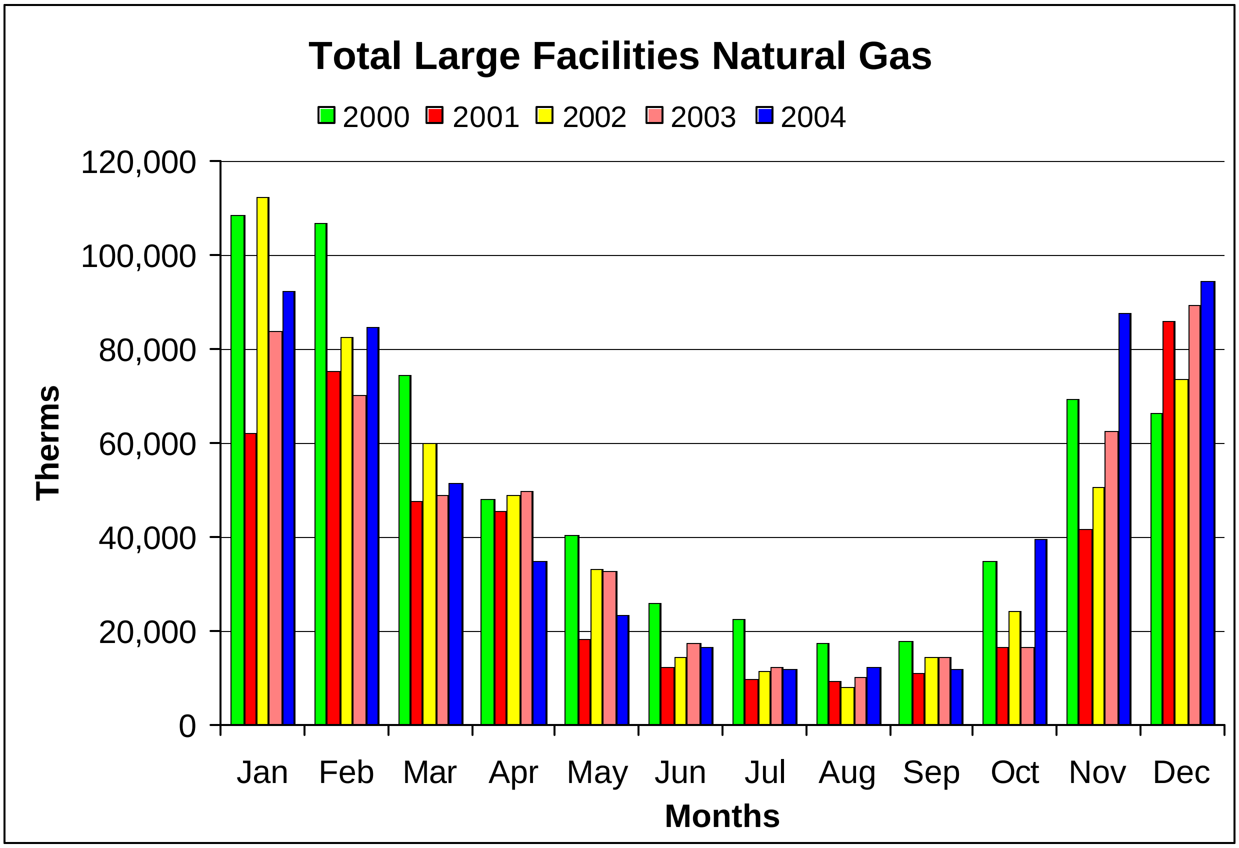
Monthly Electricity Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	3,875,610	3,730,495	3,734,012	3,741,297	4,203,032	4,514,551	4,569,668	4,502,549	4,315,467	4,046,549	3,966,898	3,465,756
2001	3,217,618	2,795,739	2,868,600	2,889,411	3,353,174	3,390,291	3,568,565	3,545,440	3,330,794	3,167,676	3,058,637	2,958,211
2002	3,060,988	3,163,835	3,100,210	3,048,671	3,385,129	3,533,268	3,824,442	3,671,358	3,665,154	3,356,441	3,033,353	3,258,925
2003	3,175,518	3,171,571	3,099,912	3,026,885	3,486,049	3,639,418	4,050,205	3,796,604	3,784,931	3,393,181	3,237,773	3,218,662
2004	3,115,455	3,051,524	3,087,862	3,074,396	3,431,852	3,744,966	4,065,211	3,810,421	4,448,525	3,671,033	3,774,229	3,546,465



Monthly Electricity Demand

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	11,539	11,584	12,021	12,195	12,932	13,833	13,655	13,704	13,704	12,881	11,914	11,072
2001	10,788	10,248	11,201	11,355	12,449	12,534	12,702	12,433	12,006	11,894	10,910	10,295
2002	10,527	10,923	11,634	11,257	11,887	12,732	12,772	12,451	12,563	11,893	10,695	10,522
2003	10,476	10,589	10,739	10,805	12,170	12,326	12,926	12,515	12,657	11,659	11,156	9,945
2004	10,005	10,037	11,339	11,428	12,195	12,795	13,126	12,281	13,295	12,293	11,576	11,264



Monthly Natural Gas Consumption

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	108,689	106,589	74,325	48,032	40,608	25,888	22,509	17,552	17,909	35,108	69,442	66,288
2001	62,011	75,322	47,513	45,393	18,356	12,451	9,805	9,383	11,239	16,507	41,693	86,081
2002	112,297	82,750	60,050	49,116	33,336	14,626	11,565	8,225	14,342	24,102	50,789	73,733
2003	83,869	70,101	48,824	49,700	32,927	17,290	12,254	10,307	14,584	16,509	62,662	89,448
2004	92,240	84,857	51,504	34,747	23,291	16,731	11,877	12,507	12,011	39,602	87,599	94,370